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BASIC FACTS ABOUT WILCOX 96 SERIES TRANSMITTER

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POWER OUTPUT: 2500 watts.

TYPE OF EMISSION: A1, A2, A3 or F1.

SIMULTANEOUS OPERATION of two channels modulated or three channels A1 or F1.

OUTPUT CIRCUIT: Balanced or unbalanced 500 to 600 ohms.

POWER REQUIREMENTS: 220 or 380 volts, AC—50-60 cycles.

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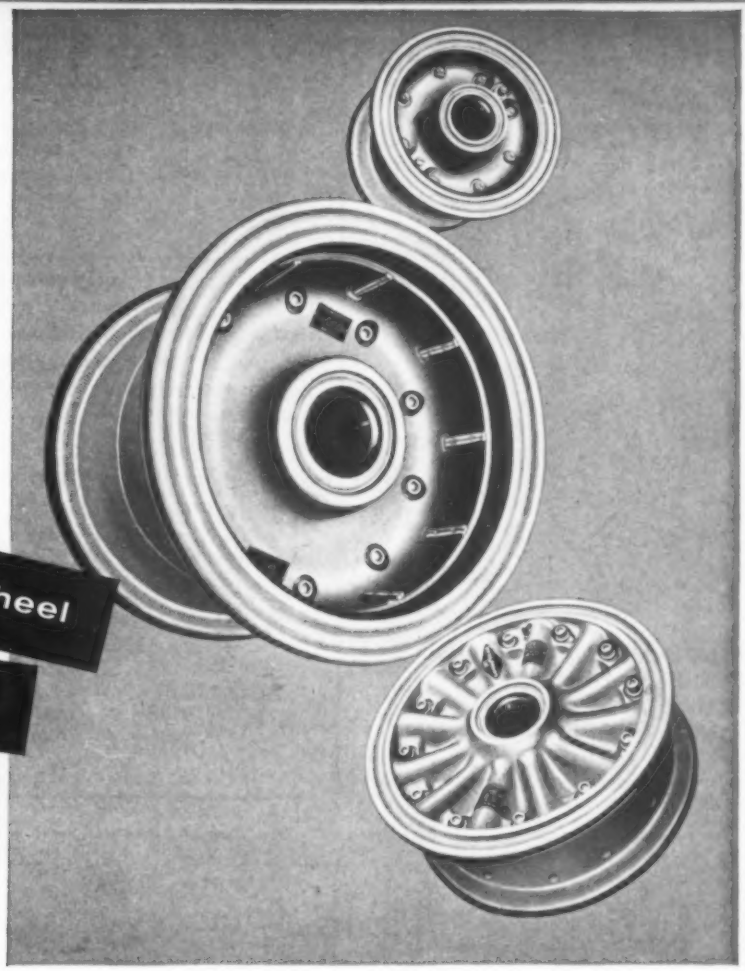

New Forged Airplane Wheels by Goodyear are delivering greater strength at spectacular weight-savings to the aeronautics industry.

The forged airplane wheel is the latest laurel to be added to the list of Goodyear achievements in the advancement of the efficiency of the airplane wheel.

Our pioneering work in forged magnesium wheels was undertaken to deliver wheels of record capacity per pound, greater "roll life" to meet the special needs of specific aircraft, such as long-range commercial, military, and particularly jet aircraft – "where every ounce and every pound counts!"

The advantages of forged wheels are well worth while for those aircraft which must extract maximum performance from every pound of metal. For example, weight-savings average 15% per wheel over conventional cast magnesium wheels.

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Air Traffic News (Incorporating Air Traffic Digest): Daily rates and tariff news. $175 per year. Managing Editor—Wallace I. Longstreth.

Airports: Weekly newsletter for airport officials, suppliers, and services. Airmailed every Friday. $25 per year. Managing Editor—Lois C. Philmus.

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AIRTRENDS Washington, D. C., May 9, 1955

WEST COAST AIRCRAFT PRODUCERS are staying on the sidelines in the furor following Air Force Secretary Harold Talbott's stated policy favoring inland dispersal of future aircraft industry expansion. Manufacturer's approach is to "let the Chambers of Commerce fight it out with the politicians."

Meanwhile two specific instances of application of the dispersal policy have come to light. Boeing Airplane Co., is now seeking a new production site for its IM-99 Bomarc missile, Lockheed Aircraft Corp., has been offered a large contract for a missile based on its X-7 ramjet test vehicle provided that it not be produced in California.

Army and Navy follow-up of Talbott's action can also be expected. Reason is that such geographic dispersal was No. 2 item on Defense Secretary Wilson's 7-point defense procurement policy issued to all three services on December 7, 1954.

NEW USAF POLICY OF AIRLIFTING ENGINES for overhaul, coupled with increase service life of Allison's J35 engine, has brought Air Force cancellation of orders for 523 of that type engine. As a result, J35 production will end this summer with more than 14,000 engines built since it started in 1946.

AIR FORCE HESITANCY in approving commercial jet production by Boeing Airplane Co., could be explained by some new planning as to the role of the KC-135 jet tanker.

Reason is that original concept of one-for-one production of KC-135 for B-52 in-flight refueling is being widened to take in the USAF medium bombers and Century series fighters.

Result could bring tanker orders far in excess of those originally anticipated. It would also explain AF apprehension over mixed civil-military production by Boeing.

U. S. AIR FORCE AND NAVY have submitted a 10-year powerplant development program to Defense Secretary Wilson for approval. It represents a jointly developed forecast of probable powerplant developments both "feasible and needed" to match aircraft procurement for the period. Listing of actual projects in the program is classified.

ADMINISTRATION'S CURRENT BROWN-OUT on information about Defense activities is still very much alive despite belated clearance of controversial Senate Republican Policy Committee's 36-page recap of new aircraft, missile and weapons developments. Most recent indication is Navy's ban on further display of missiles, experimental aircraft or other new devices.

Democrats, meanwhile, are capitalizing on Administration's inconsistencies in regulating security. In separate statements, GOP report has been labeled "shocking," "invaluable to the enemy," and completely contradictory to the President's recent order tightening up on release of military information.

THE NATION'S VAST GUIDED MISSILE PROGRAM is averaging a new review every 15 months. The latest, submitted to the Senate Appropriation Committee on February 16, was the eight in the past 10 years. Only 1948 and 1952 have passed without such a study.

Industry News Digest

NWA Ups Plane Orders

Northwest Airlines has increased its order for new Douglas aircraft from 10 to 14—eight DC-7Cs and six DC-6Bs.

Total order is valued at about $27 million. Deliveries are scheduled between January and October, 1957.

Senate Votes Funds For Tacan Inquiry

Senate Rules Committee has favorably reported a resolution which would appropriate $125,000 to finance a joint Congressional investigation of the VOR/DME-Tacan navigation systems dispute. It is also subject to House approval.

Navy Orders New Bell 'Copter

Bell Aircraft Corp. has received a $1,584,836 Navy order for eight test HUL-1 utility helicopters, a further development of the HTL (Model 47) series.

The HUL-1 carries three passengers and pilot instead of two-and-one in the HTL. It is powered by a derated 250-horsepower Lycoming engine from which Bell will take only 220 hp. New design also includes boost controls, and has monocoque cabin and fuselage.

Avgas Sales Limited By AF Policy

USAF aviation gasoline will not be sold to civil aircraft operators in competition with private enterprise under new policy adopted April 25. Here's how revised AF regulation 67-53 governs future sales:

Non-contract/charter aircraft—AF will sell only emergency fuel supply and payment must be cash or credit-supported by AF Form 51.

AF Contract Carriers—May obtain fuel for cash, with Form 181 credit certificate, or by guaranteeing payment through filing a Certificate of Security.

Charter Carriers—May procure avgas for cash or through credit Form 181.

Another Flying Platform

A new helicopter, employing a "stand-on" system of control and resembling in some ways the flight principles of Hiller's "flying platform," was unveiled by de Lackner Helicopters, Inc. of Mt. Vernon, N. Y. during the recent American Helicopter Society meeting in Washington.

The DH-4 uses contra-rotating propellers, driven by a standard 43 hp outboard engine located under the control platform, instead of a ducted fan as in the case of the Hiller vehicle.

Throttle and yaw control are provided by a standard bicycle-grip motorbike steering arm. Roll and pitch are accomplished by the pilot leaning in the direction of desired motion.

DH-4 has been flying since November, 1954 and has been piloted by nine individuals, four without previous flying experience. In photo above, L. C. McCarty, Jr., chief engineer and designer of the control system, pilots the DH-4.

Banker Controls HAS

John S. Gleason, Jr., asst. v.p. of the First National Bank of Chicago has purchased control of Helicopter Air Service in a deal reportedly involving more than 30,000 shares out of 51,200 existing.

T. Hamil Reidy, president, will remain as director and consultant to HAS. C. W. Moore v.p. operations, becomes president.

USAF Names Gen. Irvine Deputy Chief of Staff

C. S. "Bill" Irvine, USAF Air Materiel Command deputy commander for production, has been nominated for three-star rank and named to succeed Lt. Gen. Bryant L. Boatner as AF Deputy Chief of Staff for Materiel. Boatner is now convalescing preparatory to possible retirement.

Bunker Named AHS President

Col. William B. Bunker, Commandant of Army's Ft. Eustis Transportation School, has been elected 1955-56 president of the American Helicopter Society. Bunker succeeds John P. W. Vest, United Aircraft Corp. Sikorsky Aircraft Division.

Adm. Towers Dies

Adm. John H. Towers, president of Flight Safety Foundation and "father of naval aviation" died of cancer on April 30. Towers entered aviation in 1911 as one of the first three naval officers assigned to aviation and later became the first naval airman to reach the rank of admiral.

Lockheed Union Votes To Strike

Members of the independent Engineers & Architects Assn. at Lockheed Aircraft Corp. California Div. have voted to authorize a walkout.

A union official said that after five months of bargaining, the group rejected a 3% pay hike with a resolution that the old contract be continued. Lockheed then terminated the contract and put the increase into effect.

The EAA represents about 2500 Lockheed engineers.

Air Force's B-66 Orders Exceed 300

USAF has ordered more than 300 Douglas B-66 series twin-jet tactical bombers, including 150 RB-66s, recent budget testimony indicates.

Nine RB-66s now are undergoing flight tests to expedite engineering fixes and the 150 on order have been rescheduled for production at half-speed rate (costing $7 million or $8 million each) pending elimination of "bugs."

AF officials told House Appropriations Subcommittee members that the airplane is "fundamentally sound" and that "even with its present known deficiencies it is far superior to combat units it is scheduled to replace."

Armament Blast Blamed In Crash of XF-104

The Lockheed XF-104 accident, in which test pilot Herman Salmon was forced to bail out at 15,000 feet, was caused by an armament explosion in which either the structure or the Wright J65 engine was involved, it has been learned. Salmon made an unsuccessful attempt to bring the aircraft down safely before deciding to eject.

Firebee Can Be Used As Drone or Missile

Potential use of Ryan Aeronautical Co's Firebee jet target drone as a combat guided missile has been disclosed by the company wtih Pentagon approval.

Performance data on the Firebee, also released by Ryan for the first time, indicates that it has a maximum speed of 610 mph at sea level or 605 mph at 40,000 feet. Range when air-launched from a "mother" ship is 760 miles based on a flight duration of 1 1/3 hours at 575 mph. Firebee's rate of climb at sea level is 8,500 feet per minute.

For guided missile use, Ryan says, a warhead or other special equipment can be carried either in the fuselage, or in pods under the wing. It could be ground-launched from rail or zero-length launchers as well as air-launched.

USAF Firebee is designated Q-2; Navy's KDA-1, and Army version the XM21. Army Ordnance already has received a number of XM21s for use as targets for Nike missile firings.

P&W YJ-75 Flies

Although company and Defense Department officials refuse to comment, Pratt & Whitney's new YJ-75 jet engine rated at more than 15,000 pounds thrust was flown for the first time early last month in a specifically-fitted North American B-45 test bed.

Stromberg-Carlson G-D Vote to Merge

Merger of General Dynamics Corp. with Stromberg-Carlson Co., major television and radio manufacturer and supplier of electronic and communications equipment for the Armed Services, has been approved by directors of both firms.

Common stock of Stromberg-Carlson will be converted on a share-for-share basis with General Dynamics. The electronics manufacturer's preferred stock would be called in on a basis of 1.4 shares of common per share.

Share owners of both organizations will vote on the merger proposal June 28.

The merger would broaden G-D's base of operations in the electronics field. The company also owns Convair and Canadair Ltd., as well as Electric Boat and General Atomic divisions.

Largest Nonsked Enters Plane Leasing Business

Partners of the North American Airlines nonscheduled group have entered the aircraft leasing business. Together with Andre de Saint Phalle, former board chairman of California Eastern Aviation, Inc., the group has formed Aero Leases Incorporated, with offices at 120 Broadway, N. Y.

First venture was the purchase of Eastern Air Lines' 10 Douglas DC-4 aircraft together with spare parts and R2000-7M2 engines at a price "well in excess of $4 million."

The new firm then leased five of the DC-4s back to Eastern. The other five, according to North American, have been leased to "various operating companies, one of which is California Eastern Aviation, Inc."

President of the leasing company is de Saint Phalle; vice president is Stanley Weiss of the North American group, and treasurer is Fred W. Gill, aviation consultant.

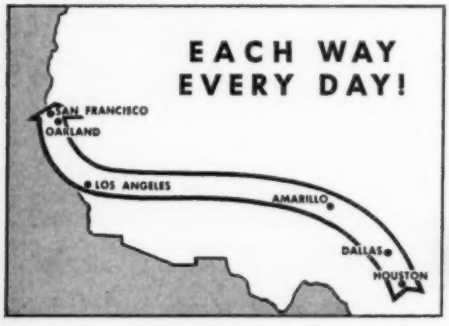
TWO PROTOTYPE YC-130 Hercules, Lockheed turboprop transports for the Air Force, are shown together for the first time at the USAF jet base, Palmdale, Calif. C-130 is in production at the Lockheed Marietta, Ga., plant. Planes are powered by four 3,750 shp Allison T56 turboprop engines turning Wright Turbolectric propellers. First production model from Marietta is flying.

Texas State Line stretches to the Pacific as Jean Autrey stakes out this sign at every stop on the skyway to California. TWA stewardess Virginia Hrubant (left) co-starred with Jean in the inaugural flight festivities.

California, here we come! Braniff hostess Jean Autrey, attired as Texas cowgirl, steps through king-size front page of Houston Chronicle to crash San Francisco Press and Union League Club stag banquet honoring airline officials on inaugural Braniff-TWA flight.

Braniff pushes Texas border to the West Coast

Houston district sales managers Dick Barton (Braniff), left, and C. D. Whitmire (TWA), are pictured with hostesses Sue Bynum (Braniff), Virginia Hrubant (TWA), and Gloria Caddell (Braniff), just before inaugural flight take-off.



A new milestone in air travel was logged recently when Braniff and TWA teamed up to provide deluxe through-flight service from the Lone Star State to the Golden Gate. The inaugural flight was launched in typical Texas style from the Houston International Airport when the big 4-engine skyliner, laden with airline officials and other celebrants, roared westward to be feted successively in Dallas, Amarillo, Los Angeles, Oakland and San Francisco.

The gala send-off was in keeping with the many advantages this new service brings to air travelers and shippers between Texas and California. It provides thru-plane flights between Dallas, Houston and the West Coast, with the combined flying skill and hospitality of two great international airlines.

Eastbound, the interchange flight connects with Braniff service to South America, and provides an additional evening flight from Dallas to Houston. Popularity of the new service is impressively evident in steadily increasing patronage.

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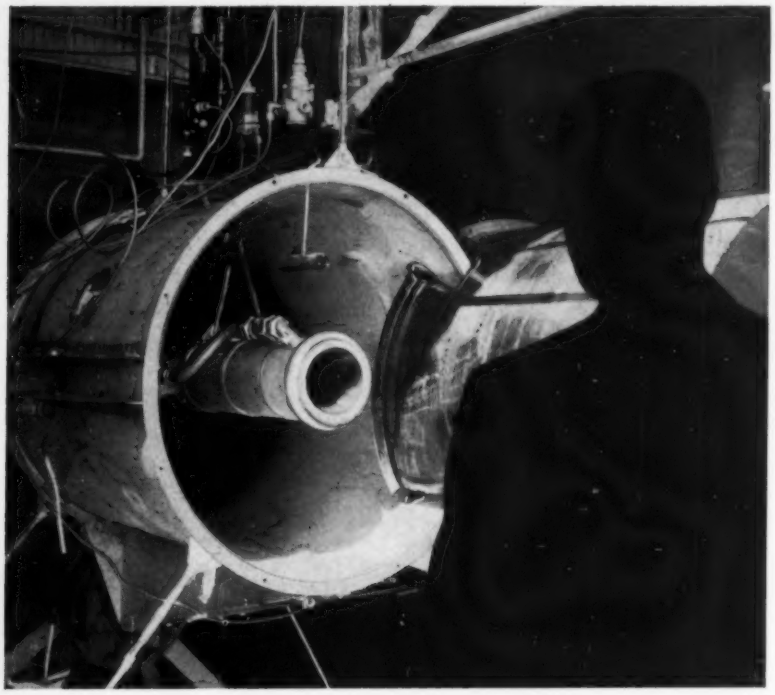
TO THE FINE ENGINEERING MIND
SEEKING THE CHALLENGING PROJECTS IN



THERMODYNAMICS

THERMODYNAMICS ENGINEERS are offered unusual career opportunities now at Convair in cool, beautiful San Diego, California, in these classifications: **Thermodynamics Engineers** for analyses of aerodynamic heating of supersonic and hypersonic missiles and aircraft, and for analysis of jet engine air induction, exit, and net installed thrust systems; **Propulsion Engineers** for analyses of turbo rocket propulsion systems, gas pressurization systems and propellant feed systems; **Engineers and Physicists** for analyses of transient heat conduction problems and thermal and structural properties of materials at high temperatures; **Engineers** for analyses and development of internal cooling systems for prime movers, accessory power drives and electronic equipment; for development of cabin heating, ventilating, pressurization systems; and for analysis and development of systems leading to the "all-weather" capabilities of inclement weather flight, and ground support systems for arctic and desert climatic extremes; **Engineers** familiar with nuclear power generation and application are needed for future development.

CONVAIR offers you an imaginative, explorative, energetic engineering department... truly the "engineer's" engineering department to challenge your mind, your skills, your abilities in solving the complex problems of vital, new, long-range programs. You will find salaries, facilities, engineering policies, educational opportunities and personal advantages excellent.

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People

Manufacturing

James S. McDonnell, Jr., president of McDonnell Aircraft Corp., St. Louis, is 1955 chairman of the United States Committee for the United Nations.

Joseph C. Johnson, project engineer with Pratt & Whitney Div., appointed manager of research and development, Titeflex, Inc.

Max DeZemplen, former flying school operator, named general sales mgr. of Voi-Shan Mfg. Co.

Pete Law, Lear, Inc. buyer, promoted to ass't, purchasing agent in charge of aircraft engineering division, Los Angeles.

Charles H. Jones, formerly mgr. of Bisbee-Douglas (Ariz.) Internat. Airport, named sales engineer for Harman Equipment Co., Los Angeles.

Rear Adm. Malcolm F. Schoeffel (USN ret.), until recently chief of Navy's BuOrd, joined General Precision Equipment Corp. as director of weapons planning.

Schoeffel

Johnson

Dr. Charles L. Critchfield, physics professor at Univ. of Minn., appointed director of scientific research for Convair.

Arthur E. Raabe, v.p. Bendix Aviation Corp., appointed to corporation staff to coordinate commercial aviation sales; **Roy H. Isaacs** becomes gen. mgr. of Eclipse-Pioneer Div., **Milo F. McCammon** ass't gen. mgr., and **Charles A. Wolf** director of sales and service. **Wendell E. Eldred** named engineering mgr. for landing gear products at Bendix Products Div.

Airlines

James R. Williams moved up from director of stations to special ass't to the president, Allegheny Airlines; **Robert C. Schumm** is new director of stations.

Jack Schopenhauer named v.p.-maintenance, Riddle Airlines.

National Airlines appointed three new senior vice presidents: **Jean C. Brawner** from treas. to sr. v.p.-treas.; **Jerome Rosenthal** from v.p.-indus. relations to sr. v.p.-indus. relations; **Alexander G. Hardy** from v.p. to sr. v.p. in chg. NAL's executive offices in Washington. Other NAL appointments: **Robert E. Wieland** from regional v.p. to v.p.; **Richard A. Fitzgerald** to ass't v.p.-Washington; **William A. Perry** from gen. sales mgr. to ass't v.p.-sales; **Lewis W. Dymond** to ass't v.p.-operations; **Howard A. Pike** to ass't v.p.-maint. and engr.; **Gilbert W. Paul** to ass't v.p.-New York.

Air Transport Stocks: An Up and Down Trend

IF THERE are two words that could characterize air transport stocks, up and down would seem appropriate. This is not only true of the five-year period under consideration (1950-1954), but also for the preceding five years.

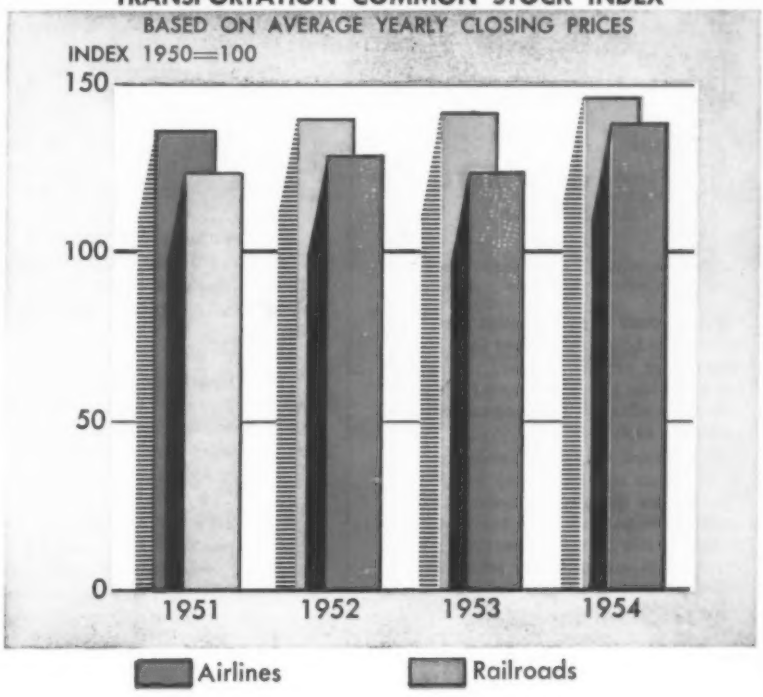
AMERICAN AVIATION'S average closing price common stock index (1950 = 100) of the Big-4 (American Airlines, Eastern Air Lines, Trans-World Airlines, United Air Lines) and Pan American World Airways was 173.9 for 1946. Yet nine years later for the year 1954 the index was 138.4, a decrease of 20.4% while the stock market in general was rising.

Volatility of these stocks is readily apparent when compared to the railroads. A comparable common stock index of 16 major rail carriers was 122.5 in 1946 and 146.0 for 1954 (1950 = 100).

While 1954 was a pretty good year (+ 11.5% over 1953) as far as stock appreciation was concerned, there is every indication that 1955 should be better. (See accompanying chart.)

The airlines will continue to grow. In order to attract private capital in the open market which will insure a healthy growth, they will have to offer the prospective investor a more reasonable return on his money. The CAB may look upon airlines as a "regulated" industry but the average investor wants regular instead of "regulated" dividends.

TRANSPORTATION COMMON STOCK INDEX



Aircraft Manufacturers: A Bull Market

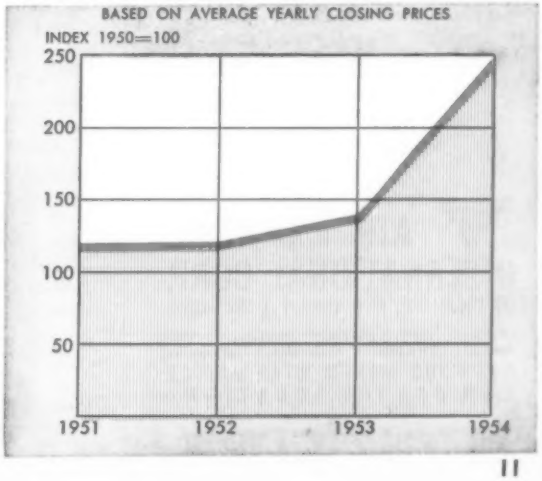
IF YOU had an aviation portfolio on December 31, 1954, composed of all the outstanding common stock of Boeing, Curtiss-Wright, General Dynamics, Lockheed, North American and United Aircraft it would have been worth 2.48 times what it was on June 1, 1950. This of course does not include dividends you would have received during this five year period.

A yearly stock index (1950 = 100) based on the average closing price of those common stocks reveals steady growth for the five-year period ended December 31, 1954. Last year was outstanding in terms of common stock appreciation.

With the backlog of orders dipping slightly under 15 billion dollars and employment running around 790,000 there is little likelihood that the aircraft manufacturers common stock index will go over 265 in 1955. This of course assumes no "hot" war.

Not included in the index are such firms as Bell, Douglas, Fairchild, Grumman, Martin, McDonnell, Northrop, Republic, Ryan, etc. However, the firms who are included in the index accounted for a majority of the volume and value of trading in aviation manufacturing stocks.

AIRCRAFT MANUFACTURER'S COMMON STOCK INDEX



AIR EXPRESS INTERNATIONAL'S rise has been termed "meteoric" and in the sense of swift or rapid, the word is apt. But AEI's rise has been a controlled one, blueprinted in advance, designed to blaze new paths for airfreight.

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AEI's policy has spurred its growth from 1935 when it grossed $35,000... to 1950 with a sizable gross of $2,000,000... to double that with $4,000,000 in 1953... AEI's air cargo revenue for 1954 grossed better than $5,500,000.

Service has grown with volume too. AEI, the world's oldest airfreight forwarder... is also the world's largest... with more than 300 branches and agency locations throughout the world.

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Production Spotlight

• First of the USAF's Boeing KC-135 jet tankers will roll out some time during March or April 1956. Boeing already has started to load jigs at its Renton, Wash., plant for the $700-million tanker production.

• Republic XF-84H supersonic propeller research aircraft powered by the Allison T40 turboprop is at Edwards AFB undergoing ground tests and propeller vibration studies but has not yet flown. Engine oil system difficulties are reportedly delaying its first flight. XF-84H program is aimed at future development of an all-purpose turboprop fighter and fighter-bomber aircraft.

• Lockheed Aircraft Co.'s jet tanker, for which a Phase I development contract has been let by Air Force, has received a temporary military designation of KCX. Company designation is CL-291.

• Total number of Navy afterburner-equipped turbojets as of March 1 was only 268.

• Royal Canadian Air Force is considering the twin-jet English Electric Canberra, or its U.S. counterpart, the Martin B-57A, as a replacement for its ground support tactical B-25 Mitchells now being flown by auxiliary units.

• Convair has leased a Remington Rand Univac Scientific ERA-1103 computer for use in its windtunnel building at San Diego, Calif. Output of the Univac is connected to a special Charactron tube and an electric typewriter for recording "test run" data on aircraft, missiles, or atomic engine designs.

• Continuing production difficulties with the ENMASA Tigre have forced Construcciones Aeronauticas to turn to Alvis and Pratt & Whitney Aircraft for engines for its CASA 201 Alcotan transport. A large number of these twin-engine aircraft have been built by the Spanish company, but are grounded due to lack of powerplants.

• American Airlines will soon follow United Air Lines' recent $2.5-million purchase of airborne radar from Radio Corporation of America with a similar order for 40 units, also from RCA. AA installations, however, will be confined to DC-7 aircraft—UAL's included all aircraft with first installations slated for its Convair 340s.

• Latest high-altitude research vehicle is the Aerobee-Hi, a successor to Aerojet-General's Aerobee. New missile, which can carry about 150 pounds up to 180 miles altitude, will be pressure-sealed. Attempts to check air density at high altitudes were foiled with the Aerobee as gases escaped from inside the rocket. Twenty-two of them will be fired at Fort Churchill during the International Geophysical Year 1957-1958.

• An unmanned orbital space vehicle, designed to gather data during several days of circling the earth, might be kept down to one foot in diameter and one foot in height, according to latest estimates. Temperature would be no higher than room temperature, provided good heat conductivity were designed into it.

• Use of rocket-powered research aircraft poses special problems. The fuselage of the Bell X-1A contracts 3/32 inch when its liquid oxygen tanks are filled. Vent ports, to carry off the vaporized oxygen, consistently have to be built twice as large as calculations indicate. Powerplant test stands must be built as painstaking duplicates of the actual installation in the plane, with every bend and position reproduced, to avoid unpredictable pressure drops.

• Vickers-Armstrongs has started a big campaign to sell the Viscount Major, stretched-fuselage version of the 700 series of the turboprop transport. Prototype should fly in late summer or early fall and production will start six months later. Only customer so far is British European Airways, but orders are likely from other sources soon.

• The Indian government is interested in a proposal for the Folland Gnat lightweight fighter and its Bristol Orpheus engine to be built in India. Relative simplicity of both units is a powerful point in their favor.

When & Where

May 9-11—Institute of Radio Engineers national conference on aeronautical electronics, Biltmore Hotel, Dayton, O.

May 16—National Fire Protection Assn. annual aviation seminar. Cincinnati.

May 17-19—Aircraft Industries Association annual board of governors mtg., Williamsburg, Va.

May 18-19—Air Navigation Development Board radar beacon symposium, Hotel Statler, Washington, D. C.

May 18-20—California Association of Airport Executives annual convention, Long Beach, Calif.

May 18-20—National Telemetering Conference, Chicago.

May 26-27—Electronics Components Conference, sponsored by I.R.E., AIEE, RETMA, West Coast Electronic Manufacturer's Association, Ambassador Hotel, Los Angeles, Calif.

May 31-**June** 4—Aviation Writers Association annual convention, Montreal and Toronto.

June 12-17—Society of Automotive Engineers summer mtg., Atlantic City.

June 18-25—Third annual Transcontinental Air Cruise, Palm Springs, Calif. to Philadelphia.

June 21-24—Institute of the Aeronautical Sciences and Royal Aeronautical Society joint meeting, Los Angeles.

June 21-24—Aviation Distributors & Manufacturers Assn. mid-year meeting, Brainerd, Minn.

June 23-25—Institute of Navigation annual meeting, Maxwell AFB, Alabama.

July 2-6—9th Annual All-Women's Transcontinental Air Race, Long Beach, Calif. to Springfield, Mass.

Aug. 10-14—Air Force Assn. Convention and Airpower Panorama, San Francisco.

Aug. 22-23—Symposium on Electronics & Automatic Production, Stanford Research Inst., San Francisco.

Sept. 26-27—Automation Symposium, sponsored by Radio-Electronics-Television-Manufacturer's Assoc., University of Pennsylvania, Philadelphia.

Oct. 11-15—Nat'l Assn. of State Aviation Officials annual meeting, Dallas.

Oct. 11-15—Society of Automotive Engineers aeronautic meeting, aircraft production forum and engineers forum, Los Angeles.

Oct. 31-**Nov.** 1—East Coast Conference on Aeronautical and Navigational Electronics, sponsored by I.R.E., Baltimore, Maryland.

Oct. 31-**Nov.** 2—Society of Automotive Engineers transportation meeting, St. Louis.

INTERNATIONAL

May 30—Fifth International Air Display, Ypenburg, The Netherlands.

May 31—International Civil Aviation Organization Assembly, ninth session, Montreal.

June 4—Canadian Int'l Air Show, Toronto.

June 10-20—International Aircraft Show, Paris.

July 27-29—Helicopter Congress, Rotterdam Helicopter Syndicate, Rotterdam.

Aug. 30—International Civil Aviation Organization air navigation conference, Montreal.

Sept. 6—International Civil Aviation Organization conference on draft protocol to amend Warsaw convention, The Hague.

Sept. 6-11—Society of British Aircraft Constructors Aircraft Show & Flying Display, Farnborough, England.

Nov. 1—International Civil Aviation Organization, Pacific regional air navigation meeting, Manila.

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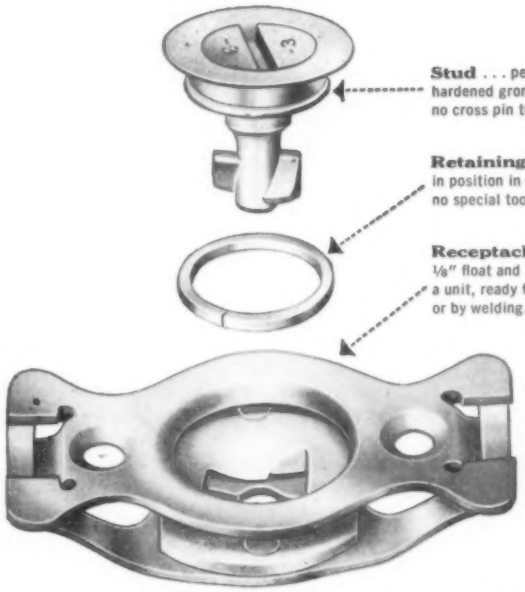

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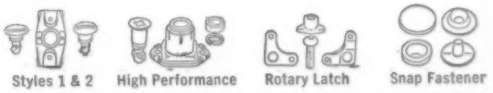

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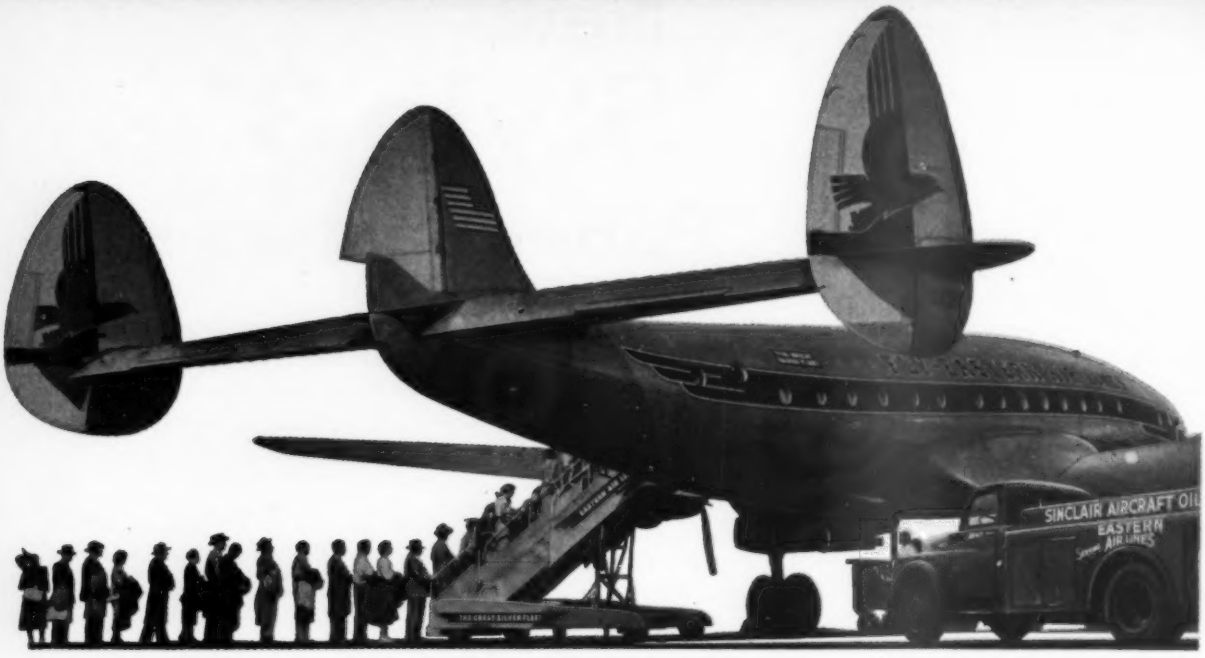

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Personal View

By WAYNE W. PARRISH

Facing the Facts

IT SEEMS to be in order for a second look at the TACAN-VOR/DME controversy. By stating the issue in its simplest terms it might even be said that instead of a controversy, the whole issue is a dilemma created by technical progress.

A. If it is correct that VOR/DME is definitely not suitable for future military operations, and

B. If it is agreed that the operation of two distinctly separate navigational systems is not practical, then—

C. Maybe it's time to get down to plain talking and face the issue squarely that VOR/DME must be supplanted within the foreseeable future by a common civil/military system which, presumably, is TACAN.

If A and B are true, then the recent recommendation by the Air Coordinating Committee that civil DME be continued in operation until 1960 is nothing more than a futile gesture designed to appease critics and protestants who oppose the dumping of a costly system in favor of something they know little or nothing about. But if A and B are true, it is much more of a dilemma than a controversy because TACAN is going to win out and should do so if it's the only alternative.

Civil groups can hardly be criticized for objecting to the sudden TACAN push. The military can and should be criticized severely for bottling up under a nonsensical "classified" label the entire TACAN story. Such secrecy is bureaucratic stupidity in its most outstanding form. But if TACAN is what it is supposed to be, and is the only system suitable for future military use, then the broader picture, and not localized blundering, must be considered.

So if A and B are correct, then let's face the issue frankly and admit that the price of technical progress comes high and move ahead with plans for a switch-over. Prolonging a system which is going into the discard is merely an additional expense. Judging from military appropriations, TACAN is moving ahead rapidly. It won't be stopped. The broader view seems to call for a realistic approach. Costly and inconvenient as it may be, a common civil/military system is essential and the unswerving trend is toward TACAN.

Regularity vs. Claims

JUST LATELY there has been a rash of highly competitive airline advertising which we don't think adds to the stature of the industry. Claims and counter-claims don't sell tickets. Without trying to untangle who started it and who's right and who's wrong, we submit the public is less concerned about competitive claims than airline managements believe.

All airlines, of course, should be realistically honest in their published schedules. Those who aren't should mend their ways. But in the long run the public isn't fooled when advertised schedules aren't met. What concerns us most is the record of delays especially since the first of the year. When a passenger can report that only one out of five or six flights departed and arrived on time, a competitive battle over rival claims is meaningless.

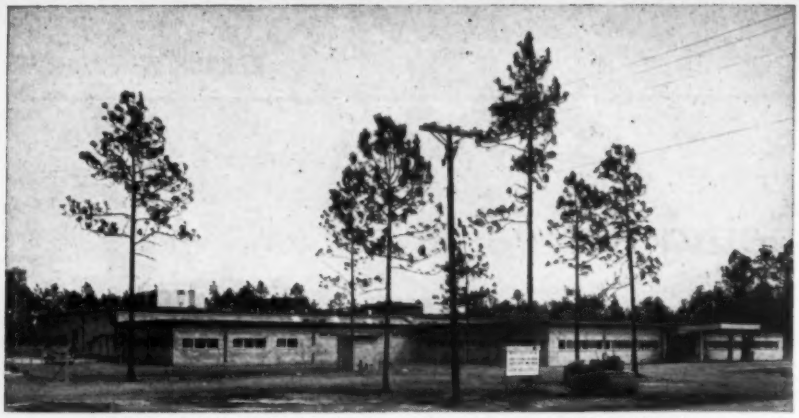
We think the flying public is tolerant of weather delays. We think it is patient with mechanical delays. But there have been too many delayed departures due to mechanicals, too many in-flight incidents involving severely rough trips, and too many airport landing incidents, to permit advertising battles in the press. What the public wants is reasonable assurance of reaching destinations reasonably on time with reasonable comfort. Until this goal is reached advertising should be devoted to its primary purpose of converting more people to fly.

Thirty Growing Years

FEW SUCCESS STORIES in aviation's history can match that of Collett Everman Woolman who completed on May 1 his 30th year as general manager of one company. From a small crop-dusting outfit called Delta Air Service in Monroe, Louisiana, to the present Delta-C&S Air Lines with 10,000 route miles serving 55 U. S. cities and six Caribbean countries, is a noteworthy three-decade achievement.

One chapter in Woolman's early crop-dusting history not too well known in the industry is that he pioneered this new agricultural service in Peru in order to obtain year-round utilization of his equipment. While dusting cotton plantations down there, the government asked for bids for the first airmail service along the coast. Woolman and Harold R. Harris won the bid and began the first airline on South America's west coast. In time this operation became the start of Pan American-Grace Airways. Harris remained to become operating head of Panagra until World War II, while Woolman returned to the U. S. and began scheduled passenger operations between Dallas and Atlanta in 1929.

Known as "C.E." to friends everywhere, Woolman is an exceptionally popular executive in his own company. For consistency of record and of growth, we salute him on his 30th anniversary as one of aviation's most successful and devoted pioneers.



NEW ELECTRONIC PLANT for Sperry Corp. goes up in Gainesville, Fla.

BUSINESS

United's Answer to Interim Transports: More DC-7s, DC-6Bs

BY 1960, jet transports may be in over-ocean service, with turboprop transports serving domestic routes, but what does an airline do for equipment until then? United Air Lines answered the question last month when it placed an order for 17 Douglas DC-7s and 11 DC-6Bs. Coming on top of last year's order for two DC-7s, 10 DC-6Bs and five DC-6As, the move brought the cost of UAL's recent equipment buying to some $64.8 million. Commented UAL president W. A. Patterson: "The continued growth of air travel and shipping must be accommodated."

United would have preferred to accommodate it with the purchase of turboprop aircraft, if 4,500 to 5,000 horsepower engines had been available, Patterson admitted at UAL's annual stockholders' meeting, but the engine in that power range that is on hand, Rolls-Royce's RB 109, is not sufficiently along in development.

At Douglas Aircraft Co., 1960 was also being talked about as the date when jet and turboprop transports would be in service, but Douglas saw them "in extensive use" by that time. Since this estimate might see the first such aircraft entering service within the next three or four years, president Donald W. Douglas agreed that it was almost time for the firm to decide which type it would be profitable to concentrate on building first. "We cannot build both at the same time," said Douglas.

While the company is making up its mind, it will not lack other projects with which to occupy itself. Commercial backlog as of March 31 was a record $332 million, with almost $100 million more under negotiation, and the orders run through June, 1957.

Facilities

• Sperry Corp. has begun installing $2-million worth of machinery in a new plant for its Electronic Tube Division in Gainesville, Fla. (see photo). The air-conditioned, 60,000-square-foot plant will produce highpower klystron and traveling wave tubes.

Contracts

• Western Air Lines directors authorized the purchase of seven DC-6Bs, at about $1.2 million each, with deliveries scheduled for 1957.

• Stroukoff Aircraft, West Trenton, N. J., will be kept busy for about 2½ years incorporating boundary layer control into Fairchild-built C-123B transports, according to the terms of a USAF letter contract recently received. One or more of the modified transports will also be fitted with a new type of landing gear (panabase).

• General Dynamics has donated $13,000 to the Massachusetts Institute of Technology for study in nuclear science and electronics.

PROFIT & LOSS

Firm	Period	Current Net	Previous Net	Earn./Common Share Current	Previous
Amer. Airl.	Q 3/31	2,483,000	746,000	$0.30	$0.06
Amer. Bosch Arma	Q 4/3	832,935	613,028	.48	.34
Boeing	Q 3/31	6,040,613	8,378,442	1.85	2.58
Ch. Vought	Q 3/31	701,984	1,293,000	0.65	1.20
Douglas	Q 2/28	7,110,000	8,899,000	1.93	2.41
Garrett	9 mos 3/31	2,707,309	2,405,928	3.71	3.48
Marquardt	1954	263,500	159,400	1.27	.77
McDonnell	Q 3/31	3,198,709	2,754,452	4.44	3.83
Nor. Amer. Avn.	Q 3/31	8,625,000	6,070,000	2.51	1.71
Pan American	1954	10,400,000	10,800,000	....	....
Piper	6 mos 3/31	636,689	198,409	0.73	0.21
Republic	Q 3/31	3,861,480	924,905	2.89	0.69
Reaction Motors	1954	76,587	157,908	0.31	0.65
Sea. & Western	1954	-364,753	351,179	....	....
Servomech.	1954	503,900	305,100	0.66	0.40
Spartan	1954	938,640	764,582	....	....
Thom. Prods.	Q 3/31	2,714,413	1,313,131	1.20	....
United Airl.	Q 3/31	465,801	-1,069,611	....	....
United Airl.	Year 3/31	11,153,106	7,661,808	4.07	2.72

DIVIDENDS

Firm	Period	Amount	Payable	Record Date
Aeroquip	Q	10¢	June 1	May 16
Air Assocs.	..	90¢	May 4	Apr. 25
Amer. Airl. 3½% con. pfd.	Q	87½¢	June 1	May 16
Boeing	Sp	25¢	June 10	May 20
Boeing	Q	50¢	June 10	May 20
Cessna	..	25¢	May 17	May 6
Ryan	Q	10¢	June 10	May 20
Western Airl.	Q	15¢	May 16	May 2
Unit. Aircr. 5% pfd	Q	$1.25	June 1	May 13

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New paint prevents damage by hydraulic fluid, exhaust deposits, weathering on Douglas planes

Above right

Douglas DC-7, new record-breaking luxury airliner.

Applying Epon resin-based "Cat-A-Lac" to exterior wing section of a Douglas DC-7. Cat-A-Lac is manufactured by Finch Paint and Chemical Co., Torrance, California.

FIRE-RESISTANT hydraulic fluid, widely adopted by the airlines, attacks ordinary paint. Faced with this problem, materials experts of Douglas Aircraft Company began a search for a protective coating that would stand up to synthetic hydraulic fluid, as well as wind and rain, erosion at air speeds of 300-400 mph, and corrosive exhaust deposits.

In several years of investigation, more than 300 formulations were tested. *But only "Cat-A-Lac" formulated from Epon resins,* applied in exhaust path areas, was *100% intact after more than 1000 hours in actual airline service.*

Because of the unusual durability of Epon resin-based coatings, they have been adopted by Douglas and leading airline operators for plane areas exposed to hot exhaust gases, gasoline, hydraulic fluid and cleaning solvents.

• • •

If you want a paint that lasts longer, one that has excellent adhesion, resistance to abrasion and impact, ability to withstand extremes of heat, humidity and corrosive atmospheres . . . ask for *Epon resin coatings.* Call on our sales offices for names of suppliers. Write for the full Epon coatings story in the new brochure, "Planning to Paint a Pyramid?"

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NEWS BULLETIN.. *Defence*

NEW 'TROUBLE SHOOTER' FLIES BETWEEN YOU AND ATOMIC ATTACK

The days when a war started with an official declaration are gone for ever. Very likely the first we shall hear about the next war will be the noise of an atom explosion or the news that an atomic attack has been repulsed.

In cold fact, the security of the free world now lies in the efficiency of radar networks and the speed of interceptor fighters. This is why news of a successful new type of all-weather day and night fighter is news that vitally concerns you.

The capabilities of the Gloster Javelin day and night fighter are a powerful deterrent against sneak 'knock-out' raids. The Javelin is a real 'pilots' plane – tough, compact and easy to handle. It carries a two man crew because of the complexity of its radar system which needs the attention of a full time expert. This big hard hitting fighter solves an acute defense problem and has already given a new look to Western Europe's role in the event of trouble.

Full details of this remarkable fighter are still secret. It is sufficient to say here that, from the word 'go', the Javelin can be up fighting at over 50,000 ft. in a very few minutes. And that refuelling and reloading are similarly a matter of minutes.

No other day and night all-weather fighter in service today has such speed or destructive firepower. No other all-weather fighter made anywhere has such development potential. The Javelin is made by Gloster, who made the first successful turbo-jet aircraft, (one of the remarkable Hawker Siddeley Group of companies also responsible for the Hawker Hunter fighter and the Avro Vulcan four-jet Delta-wing bomber).

GLOSTER AIRCRAFT CO. LIMITED

GLOUCESTER, ENGLAND

DAY AND NIGHT ALL WEATHER FIGHTER

Gloster Javelin

Member of the Hawker Siddeley Group/Pioneer ... and world leader in aviation

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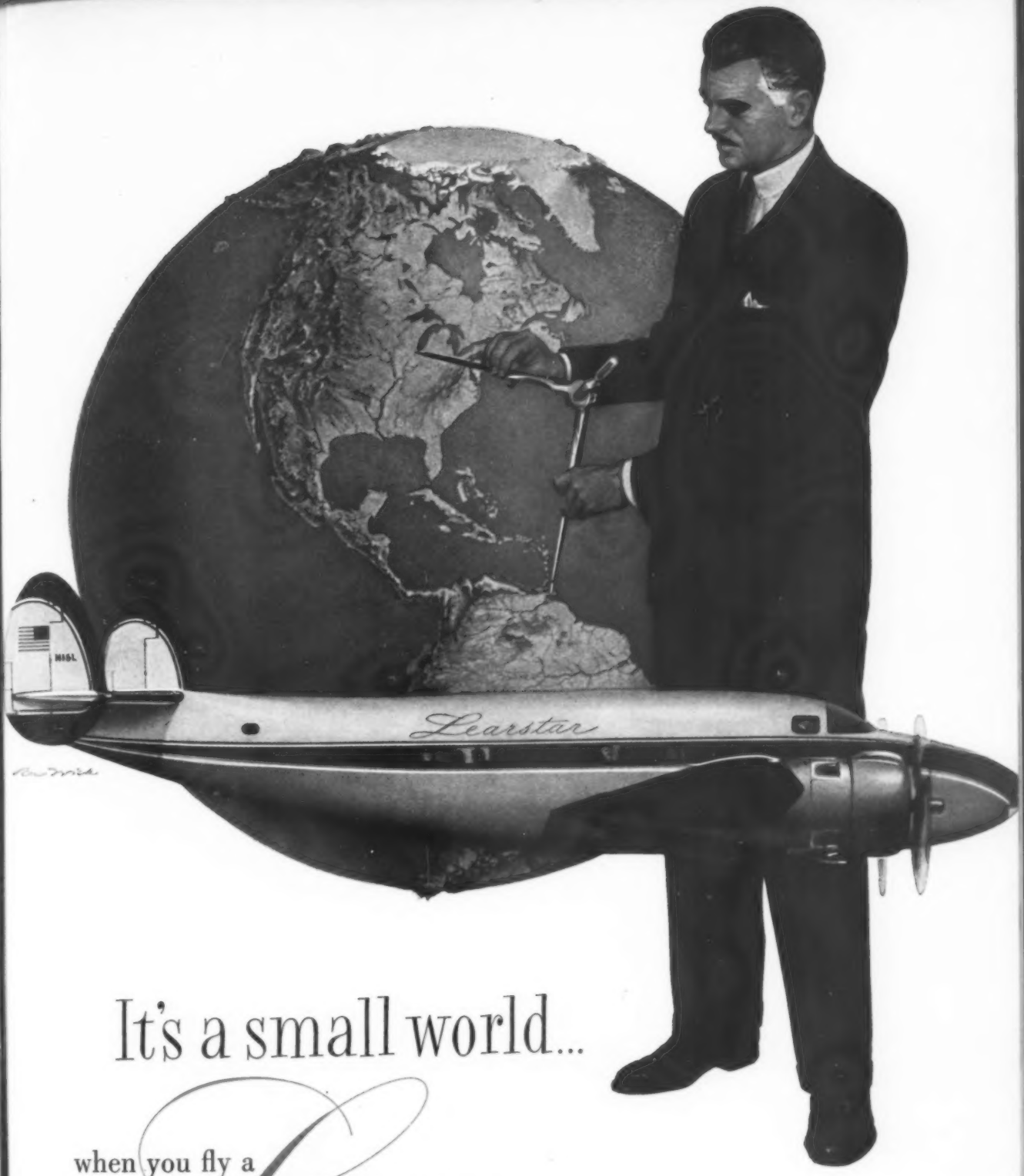

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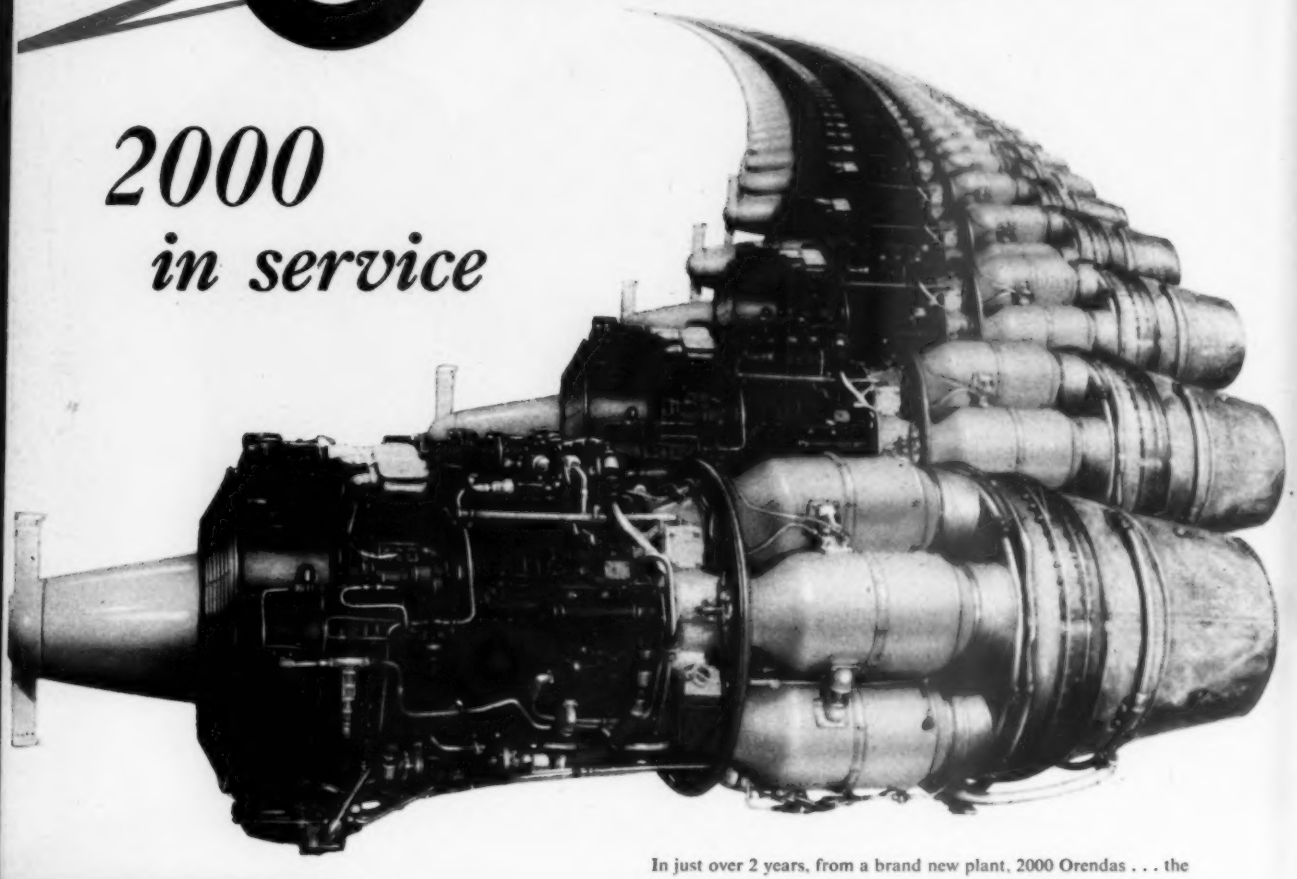
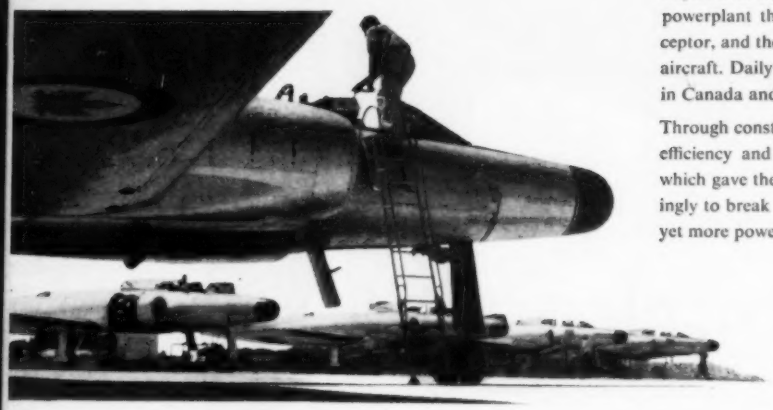
ORENDAS...

2000 in service



In just over 2 years, from a brand new plant, 2000 Orendas . . . the powerplant that makes the CF-100 long range, all-weather interceptor, and the Sabre 5 and 6 fighters, outstanding among front line aircraft. Daily these Orendas prove their leadership at RCAF bases in Canada and Europe.

Through constant development, the Orenda has increased in power, efficiency and reliability. But development never rests. The team which gave the free world this outstanding jet engine works unceasingly to break new frontiers in the gas turbine industry—to provide yet more power and efficiency for the planes of tomorrow.



Orendas in Canadair built Sabres are providing high performance operations by the RCAF at many bases in Europe.

Twin Orendas in these RCAF all-weather CF100 Mark 4 interceptors have demonstrated their efficiency in every extreme weather area in Canada.

ORENDA

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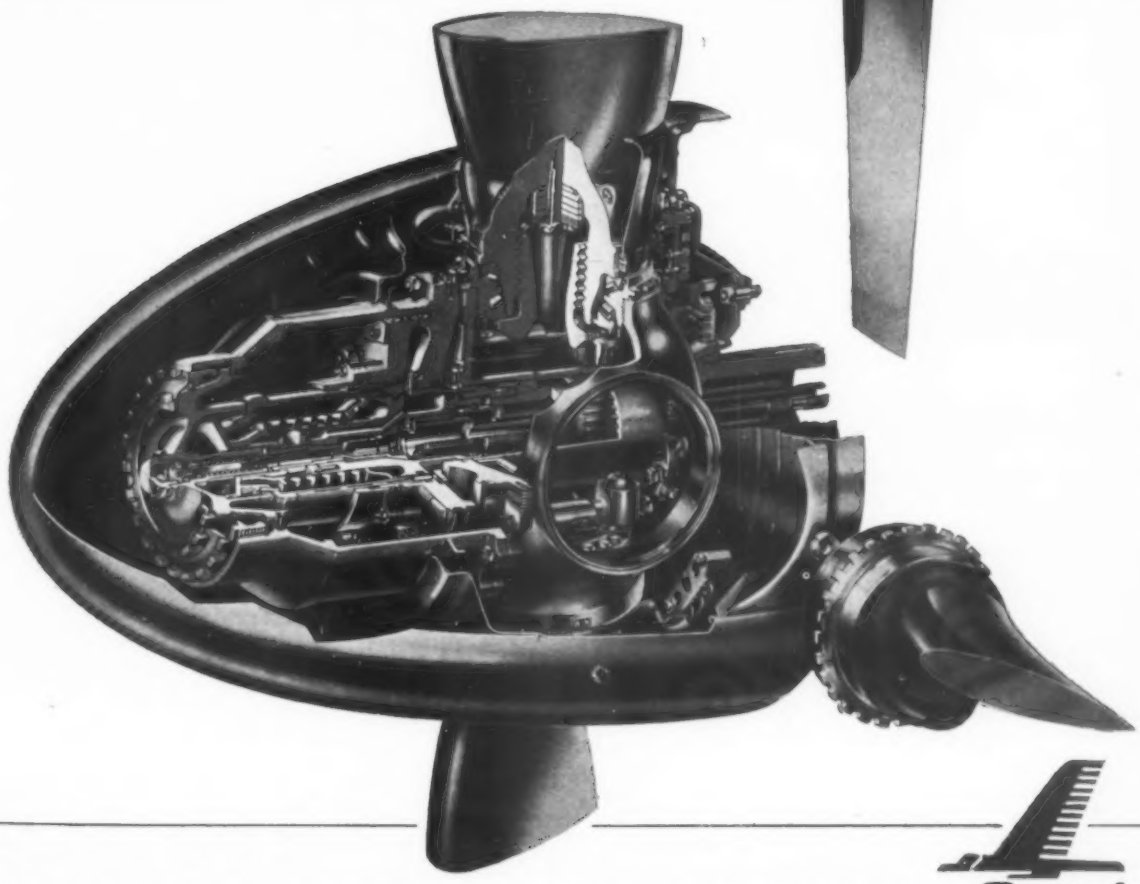

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RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Navy lands new 75-ton Lockheed R7V-2 on B. F. Goodrich wheels and brakes

DESPITE 75 tons of take-off load, the Navy's new R7V-2 "Super Connie" cruises at 440 mph. The problem was to set her down gently, stop all her weight and speed quickly. What solved the problem? The B. F. Goodrich wheel and brake designs that earned superior efficiency ratings on heavy bombers, largest airliners.

B. F. Goodrich brakes halt this Super Constellation fast because they operate on a highly efficient principle. Here's how simply this B. F. Goodrich principle works:

When fluid pressure is introduced, a full circle "tube" expands radially, applying the pressure to brake blocks around the full circle of the drum. This lifts each brake block evenly and instantly with *equal* braking pressure. It results in better load distribution on the lining, more even wear, longer lasting brakes. When pressure is released, strong retractor springs insure positive clearance . . . fast!

The B. F. Goodrich wheels on this Lockheed Super Constellation are made of magnesium alloy. This gives them extra strength without added weight. They easily passed the 200,000 lb. radial load test.

B. F. Goodrich De-Icers and fuel cells were also chosen as standard equipment for the R7V-2. Other B. F. Goodrich products for aviation: tires, heated rubber, Pressure Sealing Zippers, Avtrim, inflatable seals, Rivnuts, hose and accessories. Write *The B. F. Goodrich Company, Aeronautical Sales, Akron, Ohio.*

B.F.Goodrich
FIRST IN RUBBER

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USAF Looks to Midwest for New Production

Talbott says further expansion on coasts should be avoided; budget hearings reveal no shortage of orders in any area.

THE WIDWEST may be the site for new U.S. building in aircraft and missile production, Air Secretary Harold Talbott has announced. The move is due, he told a press conference, in order to avoid overconcentration on the west or east coasts.

"Twenty-five per cent of industrial Southern California is dependent upon military aircraft for its pay," declared Talbott, "and that is dangerous." In answer to protests from the Los Angeles Chamber of Commerce, Talbott added, "We have no idea of decreasing the amount of activity, amount of contracts, or amount of employment on the West Coast, but we think further expansion should be moved, probably to the Middle West."

Recent hearings on Air Force budget requests indicate no shortage of orders for the West or other regions, USAF orders for new aircraft will rise approximately 60% in the fiscal year beginning July 1, over the level of fiscal 1955, House of Representatives hearings revealed. Actual numbers of plane orders are due to rise from 1,462 to 2,333, at a cost of $3.55 billion.

Despite the fact that deliveries during calendar 1954 were 21% below those for the previous year in number of planes, the combat effectiveness of the USAF did not suffer, since all the reductions took place in the noncombat category. In addition, the smaller number of planes delivered was somewhat misleading, since in terms of airframe weight there was only a 3% fall-off.

• **Average production** figure for the calendar year was 435 planes per month, with June reaching a peak of 492, reported Brig. Gen. T. P. Gerrity, director of procurement and production in the office of the Deputy Chief of Staff-Materiel. USAF acceptances amounted to 94% of scheduled plans.

During calendar 1955 deliveries will continue at about the 1954 rate (about 102 million pounds of airframes). Gerrity told the House Military Appropriations Subcommittee, and will thereafter be reduced gradually. Levelling-off will come at about half the present rate, according to Roger Lewis, AF Assistant Secretary for Materiel.

Such a production schedule should give the USAF 22,427 planes by this July, and 22,940 one year later. The inventory stood at only 12,295 pre-Korea. With this growth, the program aimed at giving the USAF 137 wings by June 1957 is ahead of schedule, Air Secretary Talbott declared. The Air Force had 115 wings last June, should have 121 wings this June, and 131 next year, reported Talbott.

• **The Air Force's** new money request was cut approximately $1.2 billion before it was sent to Capitol Hill, with about $700 million being deleted from aircraft and related procurement, James H. Douglas, Under Secretary of the USAF, told the subcommittee. The cuts were made during conferences between the Department of Defense and the Bureau of the Budget. As a result the new money request was reduced from $16.9 billion to $15.7 billion, and the portion for aircraft and related procurement fell from $6.8 billion to $6.1 billion, Douglas indicated.

The new money request as it stands contains funds for a new long-range, high-performance interceptor, Roger Lewis revealed, presumably the winner of the USAF's current competition for a Mach 2 design. Lewis described the plane as one "which will be able to effectively intercept invading aircraft at very high altitudes and at remote distances from our cities."

Orders for some new aircraft were slowed for various reasons, resulting in increased orders for earlier models. Performance of Convair's F-102 was less than satisfactory during initial flight tests, and the resultant adjustment of schedules brought more orders for the Boeing B-52, KC-135 and the North American F-100. When Douglas's C-133 turboprop transport ran into the USAF's policy of fully testing the design before ordering major quantities, the B-52 and F-100 benefited once again, to the tune of the $150 million originally planned for 36 of the big transports.

• **Among the designs** which were prospering were the Douglas B-66, the Lockheed C-130, and Bell's air-to-ground missile, the Rascal.

The Lockheed C-130, another turboprop transport, was also in favor, even though the cost was going up. Price of the cargo plane had risen from $2.71 million each to approximately $2.78 million per plane.

"Exceptional progress" was ascribed to Bell's Rascal missile by Roger Lewis. More of the GAM-63s have flown since June, 1954, than during the previous two years of testing, with a certain number living up to expectations in performance and accuracy.

The Republic-licensed F-84F, on the other hand, was on its way out at the Buick-Oldsmobile-Pontiac plant at Kansas City, Kans. The USAF's reason: "Foreseeable requirements do not necessitate the continued use of this second source." • • •

The future of turboprops in the Air Force appeared less than assured after a recent statement by Air Force Secretary Harold Talbott.

"We have men in our research and development who think we ought to skip over the turboprops entirely," Talbott told a Congressional subcommittee, and added "I am not sure but that they are right. Those are things we have to leave up to our engineering and development groups. We are making progress in the three different types."

Lockheed 1649A Specifications

Here are dimensions and design characteristics of the Lockheed 1649A, which Trans World Airlines has just ordered, compared with the current Model 1049G that TWA presently is phasing into domestic operation.

	Model 1649A	Model 1049G
Max. takeoff weight	156,000 lbs.	137,500 lbs.
Max. landing weight	123,000 lbs.	113,000 lbs.
Zero fuel weight	116,000 lbs.	103,500 lbs.
Fuel capacity	9,600 gals.	7,750 gals.
Powerplant	Wright R3350-EA2	Wright R3350-DA4
Propeller	Three-bladed (16 ft. 10 in. dia.)	Four-bladed (13.5 ft. dia.)
Wing span	150 ft.	123 ft.
Wing area	1,850 sq. ft.	1,650 sq. ft.
Length	116.2 ft.	113.6 ft.
Aspect ratio	12	9.17
Root thickness-to-chord ratio	15%	18%
Main gear tread	38.4 ft.	28 ft.

FIRST DETAILS OF LOCKHEED 1649A

Plane ordered by TWA is basically same as proposed turboprop version, with Turbo Compounds substituted.

LOCKHEED Aircraft Corp.'s new Model 1649A, ordered by Howard Hughes for 1957 delivery to TWA, represents a return to Wright Turbo Compound power for the new airfoil planned for a turboprop version and designed to improve the performance of the Super Constellation.

Except where substitution of the Wright EA2 Turbo Compounds applies, dimensions of the plane are virtually identical with the turboprop 1449/1549 projected late last year but dropped when Pratt & Whitney withdrew its proposed commercial version of its T34 engine. TWA's order originally had been for the turboprop.

The new Super Connie will have a maximum takeoff weight of 156,000 lbs., compared with 137,500 for the Model 1049G. Fuel capacity will be 9,600 gals., compared with 7,750 for the 1049G.

•Price tag on the new Super Connie is reported at $2,350,000. TWA's total cost of $70 million for 24 planes includes spares.

In addition to such potential commercial customers as Air France, KLM and other Constellation equipment users, Lockheed is expected to have a good chance to sell a military version. The new high-speed low-drag wing would contribute substantially to the speed and range performance of the Constellation-type radar picket planes Lockheed is producing for Air Force and Navy.

The Hughes purchase announcement put the Model 1649A's top speed at 400 mph and its maximum cruising speed at more than 350 mph. Block time from Los Angeles to New York nonstop would be 7 hrs. 25 minutes. Westbound, it would take 8 hrs. 37 mins. Overseas version could be operated nonstop block-to-block New York-Paris in 11 hrs. 8 mins. Paris to New York would be 14 hours.

The domestic Model 1649A will carry a space payload of 17,000 lbs. 4,700 miles. Overseas version will be capable of carrying a space payload of 16,200 lbs. 5,000 miles. Standard domestic plane will have 64 seats plus four in the lounge, and 576 cubic feet for cargo. Overseas version will have 58 seats plus four in the lounge, and the same 576 cubic feet for cargo.

Cost per 200-pound mile comes out at approximately 1.5 cents in the 2,500-mile range domestically and at about 1.7 cents in the 3,500-mile range internationally.

• **Propeller clearance** originally engineered to quiet the turboprop Super Constellation cabin is retained for the new 1649A, with inboard props being 5 ft. 1 in. out.

New systems designed for the turboprop, such as dual hydraulic system, push-pull control system with twin-cylinder hydraulic boost for each control surface, and irreversible flap system, also are being incorporated in the Turbo Compound plane. Similarly, the new wing embodies integrally stiffened skin from root to tip both top and bottom. Trailing edge has a new beaded inner skin.

Wright's EA2 engine is rated at 3,400 bhp for takeoff up to 4,000 feet altitude. Installation on the Model 1649A incorporates a prop-to-gear ratio of .35 to swing the big 16 ft. 10 in. three-bladed propeller. Manufacturer's empty weight figure for the domestic version is 85,700 lbs.; overseas version, 85,745 lbs.

Lockheed is on a tight production schedule on the new plane, attempting to pick up as much as possible of the time lost in the Model 1449/1549 shuffle. Engineering on the project was put on a 9-hr. day even before the Howard Hughes sale was consummated.

• • •

Navy Drops Westinghouse as Jet Builder

Westinghouse Electric Co., a major Navy jet engine supplier since 1943 and one of the big five U.S. jet builders will go out of quantity production later this year, Navy officials say.

However, the company is expected to continue engine development work at its gas turbine facilities in Kansas City and Lester, Pa., in the hope of selling one or more of its projects to the Air Force or Navy in the future.

First indication of the Westinghouse production cutoff came in recent Navy appropriations testimony when RAdm. Lloyd Harrison, Deputy Chief of the Bureau of Aeronautics, commented in budget hearings that one of the Navy's jet suppliers "would run out toward the end of the year."

Navy spokesman later confirmed that Harrison was referring to the Westinghouse plant at Kansas City.

History of Westinghouse jet activity dates back more than 10 years to the delivery of its Model 19A Yankee turbojet in 1943.

Later, Westinghouse J30 and J34 engines came into wide use in Navy aircraft but the company ran into considerable trouble in the development of the J46 and larger J40 jets.

Further development of the J40, which was slated for the Grumman F10F, Douglas A3D and F4D, and McDonnell F3H, was halted by the Navy in December 1953. Work on the J46 continued for use in the Chance Vought F7U-3 and A2U attack version, but late last year engine and airframe difficulties led to Navy cancellation of the A2U and reduction of F7U-3 and J46 orders.

Navy elimination of Westinghouse is not expected to affect production of Lockheed P2V-7 patrol bombers using pod-mounted J34s. It is felt that sufficient engines of this type were produced before output was stopped to take care of P2V needs.

• • •

VTOs and Boundary Layer Control help . . .

Keep Planes Flying, Instead of Rolling

BY WALTER KILRAIN

THE PROSPECT of a countryside dotted with VTO fighters, each ready to rise to the defense of an individual factory or deployed in depth around a larger target has been given a rude jolt.

A fighter wing dispersed in this manner would be almost invulnerable, the USAF's Major E. W. Geniesse, Jr., told the 75th anniversary meeting of the American Society of Mechanical Engineers. Unfortunately, however, it also would be almost unsuppliable and unmaintainable.

At least eight varieties of skilled mechanics and technicians are needed to keep a fighter wing operating, Geniesse reminded the ASME members, and each of them takes about two years to train. There are not enough of them to permit dispersing fighters all over the landscape, with a group of eight mechanics waiting under every tree to service each aircraft.

Neither would it be practical to train a single man to perform all the jobs: the Air Force cannot invest 16 years of training in every VTO mechanic, declared Geniesse, chief of the aerodynamics section, Headquarters Air Research & Development Command.

• **One step toward a solution** would be a concerted attempt to design greater reliability and simpler maintenance into such aircraft. Widely dispersed supply depots might also be set up to service small groups of VTOs, with resupply carried on by helicopters.

The problem formed part of a wide-ranging discussion of how the aircraft can be freed, at least to some extent, from its dependence on the ground. A series of papers at the joint meeting of the ASME and the American Rocket Society (celebrating its 25th year) were centered around reducing the vast expanses of concrete which typify the ground requirements of present aircraft designs.

The promise of boundary layer control in reducing landing and takeoff runs was outlined for the ASME and ARS members by John Attinello of the Bureau of Aeronautics. Attinello, prime mover in BuAer's development of a blowing system of boundary layer control, reported experiments with the Vampire, conducted by Dr. G. V. Lachmann, director of research at Handley Page Ltd. Chordwise boundary layer control up to 93% had been achieved, and drag had been reduced by two-thirds.

In BuAer tests with the Grumman F9F-4 the effect was equal to a 25% increase in wing area, with a weight penalty of only 50 pounds.

• **By the use of BLC,** Attinello continued, the weight of a plane designed to carry 10,000 pounds of payload 10,000 miles could be cut from 230,000 pounds to only 65,000.

Efficient use of such systems involves more than fitting some ducting into the wing. An integrated engine and airframe, as envisaged by Attinello, will be designed as a unit and will operate as one. Instead of using the engine merely to provide thrust, with lift and control handled by the wing and control surfaces, the integrated engine-airframe would use the powerplant to provide thrust "in the right direction at the right time." Flow control, as part of such a system, would provide for more efficient use of power than is currently possible.

At present, Attinello said, airframe manufacturers take the precaution of designing a new aircraft so it can use any one of several engines expected to be ready at a given future date. Engine manufacturers, by the same token, try to produce engines that will serve in several aircraft, thus increasing production quantities. As a result, accommodation of engine to airframe is less efficient than it might be.

VTO Engines

Engine design problems also are presented by the prospect of turbojet VTOs, as Geniesse noted. Desired speed of the air at the engine compressor is in the neighborhood of Mach 0.3 to necessary to make takeoff and transition to horizontal flight an autopilot-con- 0.5, but the VTO, pulling itself upward from a standstill, would have to cope with compressor air speeds ranging from zero to Mach 2 or 3. Even present-day aircraft have very low efficiencies at low speeds, said Geniesse, but a speed range like that of a VTO makes efficient inlet design almost impossible.

The problem of control at such low speeds might be approached by the use of auxiliary jets at the wing tips, but even with such aids it might be trolled operation.

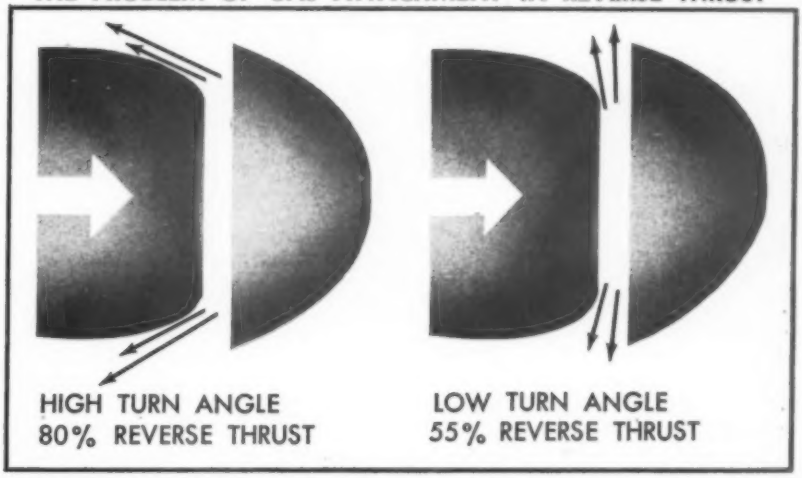
A representative of Convair observed with some satisfaction that the turboprop-powered XFY-1 has neither an autopilot nor a control problem.

The broader question of what type of performance will be required from the next series of day fighters was discussed by Geniesse with the aid of a carefully inexplicit graph (see above), plotting speeds required at various altitudes. Speeds of more than Mach 2 at 40,000 feet were presented as the probable maximum for this group of fighters.

The problem of getting such high-performance aircraft safely down on the ground, while keeping vulnerable runway length to a minimum, turned attention toward reverse thrust progress.

Charles M. Donaldson, powerplant engineer from the Wright Air Development Center, called for a retractable unit in the neighborhood of 150 pounds, producing a performance loss of only 1% or 2%, and producing a braking

THE PROBLEM OF GAS ATTACHMENT IN REVERSE THRUST



LIMIT OF REVERSE THRUST may be 55% of forward thrust, NACA research indicates, if hot gases are to be turned outward away from fuselage, avoiding gas attachment. Design at left achieves 80% reversal, but high turn angle sends gas close to tailpipe.

effect similar to what conventional planes achieve with propeller reversal. Reverse thrust equal to 30% to 50% of normal thrust is now considered adequate, reported Donaldson.

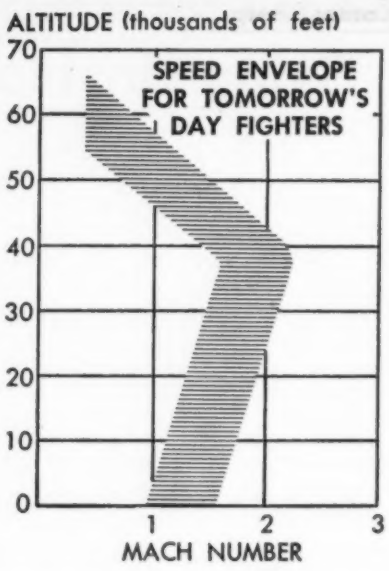
• **One big advantage** of reverse thrust units, he added, is that they would permit quicker acceleration of the engine in case of a go-around. Under present conditions, a lag of 10 to 15 seconds is likely. If a reverser is employed, the pilot can make his approach with 100% power, and in case of a go-around can obtain full forward thrust in only a second or two.

The weight of a reverse thrust unit would be offset to some extent by the fact that it would permit the elimination of drogue chutes and dive brakes, Donaldson said.

In addition to a USAF study contract with Lockheed, final report on which was due last month, Donaldson listed Goodyear, Aerojet, Marquardt, General Electric, Allison, Boeing and Douglas as being the firms most deeply interested in the reverse thrust field.

• **One characteristic** of thrust reversal, he said, is that the effect is intensified with speed. Thus at Mach 1 the reverse thrust might be 400% the normal thrust. A representative of Aerojet added that flight tests with a SNECMA thrust reverser verify this, and that at some speeds the effects "become really horrible." In some cases restrictions have had to be placed on the speeds at which the SNECMA reverser can be used.

The figure of 30-50% thrust reversal cited by Donaldson closely approximated an estimate offered by John H. Povolny, head of the experimental section, engine research division of



NACA's Lewis Flight Propulsion Laboratory.

If gas attachment is a restriction, reported Povolny, the flow of reversed gases must be angled out away from the aircraft at a fairly large angle, and NACA experiments indicate that this will apparently limit the proportion of thrust reversal to about 55% (see diagram). With the "target" type of reverser, where the gases strike some object after leaving the tailpipe and are deflected off it, this turning angle and the size of the target seem to be the prime factors. With the "cascade" type of reverser, the spacing and shape of the rings through which the gases exit are critical factors.

• **Among considerations** involved in every system, said Povolny, are reliability, lack of adverse effect on the engine, adequacy of reversal, low drag, light weight, fail-safe operation, action within two seconds or less, lack of flow attachment, and lack of effect on the aircraft's controls if used during flight.

Some comments on Povolny's paper were to the effect that reducing the plane's forward velocity at touch-down would sharply reduce the landing roll, accomplishing the same end as reverse thrust, and that this could be achieved by directing part of the engine's thrust downward during the approach.

One estimate was that if it is possible to provide such jet lift equal to 40% of the plane's weight, the landing speed would be reduced by 20% and the landing roll by 40%, although stability problems might arise.

Aerial Refueling

One solution to the problems of landings and takeoffs is to stay in the air. Aerial refueling not only reduces the frequency of those operations but also may eliminate time-consuming trips between base and operating area. The development of one refueling system, the Flying Boom, was traced for the ASME by Robert P. Person, group engineer of Boeing Airplane Co.

Work on the boom began in April, 1948. Design objectives included the following:

• **Minimum equipment drag,** weight, space and power requirements.

• **Electronic equipment** for remote contact; visual rendezvous devices; radio silence.

• **High fuel transfer rates,** with automatic start and cut-off.

• **Position of the two aircraft** during refueling such that crew vision and

FRANCE'S CARAVELLE twin-jet transport was rolled out of SNCA du Sud-Est's Toulouse plant on April 21 and currently is undergoing pre-flight checks. Engines are Rolls-Royce Avons.

airplane handling qualities would be acceptable.

• **Refueling geometry envelope** large enough to prevent unnecessary number of disconnects, but small enough to accommodate equipment of reasonable size.

• **Refueling link** controllable enough to allow rapid and convenient contact.

In order to enhance the safety of the operation, Boeing also aimed for heated and pressurized crew compartments, visual monitoring of the refueling, provision for quickly getting the refueling link out of the way of the vulnerable aircraft, surge resistant shut-off valves, and fire extinguishing systems in tanker and receiver.

As a further aid to safety and efficiency, all skills, as far as possible, were to be kept in the hands of the tanker crew.

To simplify design and production problems, and put the system into operation as soon as possible, conventional techniques and materials were made the rule.

The position of the two planes during refueling posed several problems which eventually were settled in a compromise. A wing tip-to-tip arrangement would avoid the problems of downwash, but was poor from the standpoints of visibility and a practical refueling link. Nose-to-tail was best as far as visibility was concerned, as well as equipment size, but posed the dangers of buffeting and having the receiver overrun the tanker. The stepped-down position finally was accepted as the best choice, though it was not outstanding in any one respect.

• **Placing the tanker** in the rear position would have permitted Boeing to keep the flying skills with the tanker crew, but it would have necessitated pumping the fuel "uphill". It would also have called for either a boom on the front of the tanker or one in the receiver, so this possibility was not chosen.

By the spring of 1949 the design of the boom was far enough along that production design could proceed. Pilots of large aircraft were dubious about the system, reported Person, but soon acquired skill. Fighter pilots often made perfect contact the first time they tried.

One feature of the boom is that with it the tanker can tow a small aircraft at reduced power. Several Republic F-84s already have been saved in this way.

A contrasting system of in-flight refueling, the Probe and Drogue, was championed at the meeting by John H. Sidebottom, engineering manager of Flight Refueling, Inc.

The value of flight refueling, now recognized in strategic and tactical applications, is not yet generally acknowledged in problems of air defense, declared Sidebottom, who proceeded to present a variety of possible applications.

The cost and effort of supplying tanker equipment is more than counterbalanced by the economies of the operation, he declared. If fewer planes can deliver a given bomb load on the target, through being refueled sometime after take-off or on the return trip, the cost in planes, crews, and maintenance is reduced.

• **Refueling could be used** to extend the range or endurance of early-warning radar aircraft, keeping them on station far out at sea for long periods (see sketch); of fighter-interceptors, giving them increased striking radius; of anti-submarine patrols ranging out ahead of the fleet or far from shore bases; and of Navy combat air patrols, allowing carrier commanders more freedom to chose the exact moment when it is most advantageous to turn into the wind and take them back aboard.

Any of these applications could use either a conventional tanker plane or the "buddy mission" system, in which the tanker is a plane of the same type as the receiver. On a mission both planes could take off at the same time, the tanker loaded with fuel and the receiver carrying a correspondingly increased weapon load. Refueling could then be done as the pair flies toward (or back from) the target.

The North American AJ-2 Savage, one of the Navy's largest carrier-based bombers, is now in use as a tanker, with a Flight Refueling "package" unit inserted in its bomb bay. For fighter types, without bomb bays, the refueling units can be mounted on wing pods. "Such refueling pods," asserted Sidebottom, "quickly mounted or removed, would make a tanker out of any standard carrier fighter-bomber." The fuel carried in such a mission would give an extra hour of flight to three combat air patrol jets, half an hour extra to six, etc.

The problem central to VTOs, reverse thrust, BLC, and the other ideas discussed during the series of papers was summed up by Brig. Gen. Benjamin S. Kelsey, deputy director of research and development, Headquarters USAF, as the session opened: "Airplanes today spend too much time gathering speed on the ground and not enough flying in the air." • • •

Eight-month Totals in FY '55: Services Obligate $3.4 Billion for Aircraft

Obligations by the military services for aircraft during the first eight months of fiscal 1955 totaled $3,455,683,000, leaving an unobligated balance Feb. 28 of $6,374,483,000.

Orders for guided missiles during the period amounted to $560,453,000, leaving an unobligated balance of $715,275,000 as of Feb. 28.

New military orders for electronics and communications equipment totaled $465,230,000 and the unobligated balance at the end of the period was $908,172,000.

Defense department spending for aircraft for the eight months totaled $5,302,129,000. The unexpended balance of the three services as of Feb. 28 amounted to $18.29 billion.

Here is how the services obligated and spent funds during the eight-month period.

• Obligations for new aircraft:

Air Force, $2,744,696,000; unobligated balance $5,108,514,000.

Navy, $597,065,000; unobligated balance $1,158,494,000.

Army, $113,922,000; unobligated balance $107,475,000.

• Expenditures for aircraft:

Air Force, $4,145,106,000; unexpended balance $12,521,921,000.

Navy, $1,118,101,000; unexpended balance $5,401,228,000.

Army, $26,922,000; unexpended balance $369,619,000.

• Obligations for guided missiles:

Air Force, $254,922,000; unobligated balance $456,123,000.

Navy, $78,865,000; unobligated balance $113,469,000.

Army, $226,666,000; unobligated balance $145,683,000.

• Expenditures for missiles:

Air Force, $173,852,000; unexpended balance $817,220,000.

Navy, $109,892,000; unexpended balance $407,466,000.

Army, $22,410,000; unexpended balance $594,908,000.

• Obligations for electronics and communications equipment:

Air Force, $345,215,000; unobligated balance $670,886,000.

Navy, $66,548,000; unobligated balance $110,200,000.

Army, $53,467,000; unobligated balance $127,086,000.

• Expenditures for electronics and communications equipment:

Air Force, $243,167,000; unexpended balance $1,266,655,000.

Navy, $112,291,000; unexpended balance $420,533,000.

Army, $80,105,000; unexpended balance $485,707,000.

What a Logistics Airlift Fleet Might Require

	"Heavy"	DC-4	"Medium"	DC-3
Max. payload, tons	70.5	8	28.3	3
Range, naut. miles	2080	2080	890	890
Cruise speed, knots	431	200	345	150
Productivity, ton-nautical-miles/hour	29,300	1580	9160	437

Note: DC-4 and DC-3 included for comparison.

How to Move AF Wing with Six Planes

Half of an Air Force combat wing could be moved 4,000 nautical miles in one day, using six heavy transport aircraft, with the other half of the wing flown in by a single plane during the following 12 days. The remaining five planes of the original half dozen could keep the wing supplied indefinitely

This estimate was offered to the American Society of Mechanical Engineers recently during its 75th annual meeting by Clark Henderson of the Stanford Research Institute. Henderson, an operations research analyst, based his estimate on the availability of transports with ton-mile productivity roughly 19 times that of the Douglas DC-4 (see table).

For the purpose of such a high-speed move into a combat theater, the normal 2,000-ton weight of the USAF wing would be reduced by eliminating 800 tons of materiel not needed for the first 90 days of combat. By paring weight off equipment and shifting some operations to depots, another 400 tons could be removed, leaving a total of 800 tons. Half of this figure would be airlifted the first day, with the remainder brought in during the next two weeks as the single heavy transport kept up a shuttle service.

• **Resupply** could be carried out by five aircraft, also in the "heavy" category. One, operating over the 4,000 miles from the United States, could bring in 70 tons every second day. Heavy materiel would presumably be available from depots somewhat closer to the combat area, say 1,000 miles away. The remaining four transports would each make two deliveries a day, carrying 70-ton loads, for a daily total of 560 tons.

Magnitude of the military transportation problem was pointed up by Henderson, who cited World War II figures. Moving transportation equipment was a major job in itself during the invasion of Europe.

"Nearly 71,000 vehicles, mostly trucks, were sent to France in the first 25 days of the invasion," reported Henderson. "Hundreds of locomotives and freight cars were manufactured and delivered overseas . . . Nearly 150,000 Army Engineer and Transportation Corps personnel were in England on the eve of the invasion. Most of these men were to be concerned with combat theater transportation.

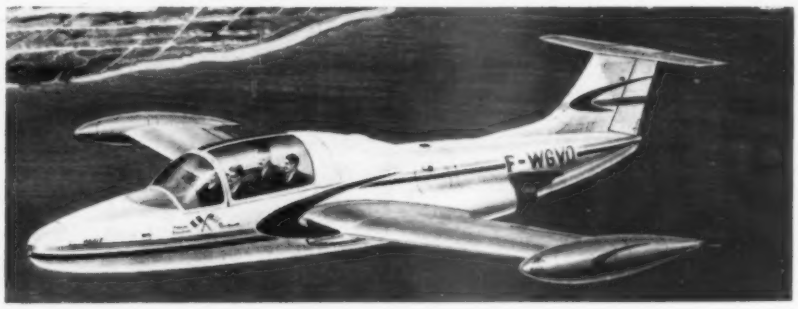
"During the latter part of 1944 . . . 27,000 men were engaged in railroad and pipeline construction. More than 130 Army truck companies, with 6,000 trucks, were used in the famous 'Red Ball Express'."

• **This massive** transportation effort put about 35,000 tons a day on the Normandy beaches during the first three weeks of the invasion (about two-thirds of that called for in the plans). If Henderson's hypothetical "medium" transports were used for such an operation, 135 aircraft could deliver the same tonnage, assuming that each made about nine daily trips from England to airfields or airdrop sites 150 miles away.

The pre-invasion buildup of supplies in England also was translated by Henderson into airlift requirements. During the five months before the invasion, an average of 15,000 tons a day was delivered to British ports from the U. S. If it is assumed that half of this was heavy materiel such as locomotives, which would continue to move by ship, then the remaining 7,500 tons per day could be flown in by 160 heavy transports.

These would travel from New England to Britain via Iceland; all refueling would be accomplished in Iceland, making it unnecessary to build up these fuel stores in Britain.

• **Airfields** for such operations are not considered by Henderson to be a limiting factor. If a field can handle five planes an hour, one could take care of all the heavy transports bringing in the 7,500 tons a day referred to above. Ten could handle the medium transports on the "invasion" schedule of 35,000 tons daily.



Beech Offers Jet Business Plane

BEECH Aircraft Corp. has entered the jet airplane field for the first time, offering a U. S.-built business aircraft version of the four-place Morane-Saulnier 760.

The M-S 760 is powered by two Turbomeca Marbore II turbojets with maximum thrust of 880 ib. each. Top speed is advertised as 405 mph, with cruise at 350 mph at 20,000 ft. At that altitude and speed, Beech says the four-place jet will have a normal range of 875 miles.

Beech plans to bring one of the French-designed planes to the U. S. for demonstration purposes. Firm orders will result in production at Beech's Wichita plant.

"We are not yet certain of the cost of the airplane when made in the United States," Jack Gaty, vice president and general manager, said, "nor are we certain when deliveries can be accomplished.

"We do feel that proposed delivery dates will be reasonable, in view of the fact that the M-S 760 has been well tested. We don't believe the price will be high enough to stop the prospects who can use this type of super-transportation."

The business plane will be fully pressurized.

Here are the specifications: wing span, 33.3 ft.; wing area, 194 sq. ft.; length 32.9 ft.; maximum height 8.5 ft.; gross weight 7,480 lb., allowing 805 lb. for four passengers and baggage and 2,350 lb. for oil and fuel.

Minimum stall speed is 95 mph. Rate of climb at sea level is 2,260 ft./min.; one engine out, 600 fpm.

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LOCKHEED T2V-1 (foreground) is first jet trainer designed for operations from aircraft carriers. It is shown with veteran Navy T2V.

Navy's New Carrier—Land-Based Trainer

Navy's new Lockheed T2V-1, featuring boundary layer control, will be the first two-place jet trainer assigned both to carriers and land bases.

First details of the 600 mph trainer were released by Lockheed, which claims the plane can be landed at 97 mph, or slower than any other jet now in service. Range will be about 900 miles.

Secret of the low landing speed is boundary layer control, accomplished by bleeding compressed air from the Allison J33 jet engine and exhausting it over wing flaps and ailerons. The system, said to be the first ever ordered into a U. S. military production airplane, increases lift and gives the plane better stall characteristics. It was developed from a system built into an F9F-4 test vehicle as a joint project of Grumman, Allison and BuAer.

The T2V-1, a new navy version of the veteran T-33 Air Force trainer, has provisions for two types of engines—either the Allison J33-A-22 (6,100 lb. thrust) or the Pratt & Whitney J48-P-8 (rated at 7,250 lb. thrust).

New cockpit arrangement features an elevated rear seat to improve instructor-student contact and observation. Wing leading edge has movable slats for better controllability and stability at low airspeeds, and trailing edge has flaps. Dimensions: Length 38 ft.; height 13 ft.; span (including 230-gal. tip-tanks) 42 ft. Gross takeoff weight is approximately 16,400 lb., and total fuel capacity is 760 gal.

CLOSEUP of Navy's newest trainer, the Lockheed T2V-1, which features boundary layer control, has a top speed of 600 mph and landing speed of only 97 mph.

NIKE: PROOF POSITIVE

Nike, a tactical air-defense weapon that is rapidly being installed by the U.S. Army in and around our most strategic defense areas, has demonstrated the reliability and producibility of rocket power.

Under subcontract to the Douglas Aircraft Company, which is associated with the Western Electric Company, prime contractor on NIKE, Aerojet-General developed the sustainer rocket motor for NIKE and is producing them for Douglas in large quantities.

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MORE POWER FOR AIR POWER

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U.S.-British Developments Share SAE Spotlight

BY JOSEPH S. MURPHY

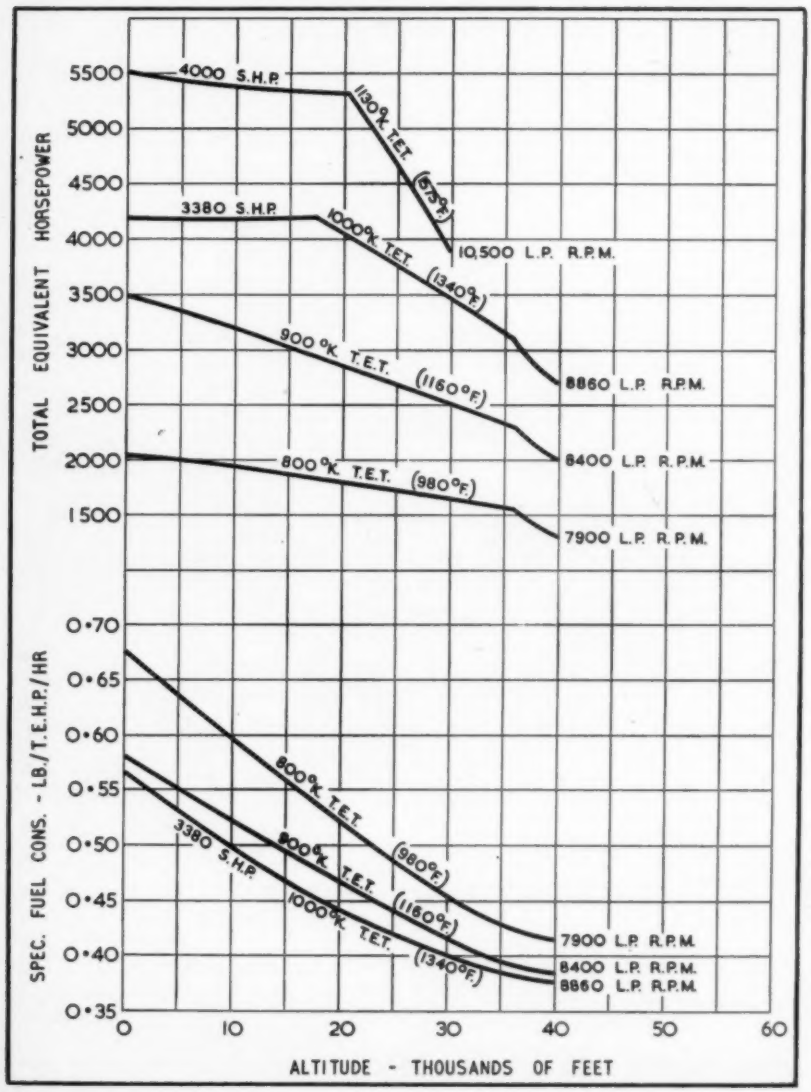
The newest and best in U.S. and British aircraft and engine developments moved into the limelight late last month as the Society of Automotive Engineers convened in New York for its Golden Anniversary aeronautic meeting.

And by the time the last of 30-odd technical papers was presented, the teeter-totter pattern that depicts American or British supremacy in one segment or another of aeronautical engineering was more evident than ever.

In new engine developments and civil turboprop transport progress, the show was all British. Unveiling of detailed design data on Bristol Aeroplane Co.'s B.E. 25 "supercharged" turboprop engine combined with an operational airline report on its Vickers Viscount turboprop transport "in-being," overshadowed anything the U.S. had to offer in these areas.

But on the long-range turboprop development scene, particularly that of military use in future tactical or logistic transport operations, the edge went to the U.S. The same was true of progress in improving overall aircraft performance through boundary layer control research.

MORE POWER for less fuel. Chart shows performance of Bristol's B. E. 25 engine at varying altitudes, turbine inlet temperatures and low pressure compressor speeds.



First disclosure during the SAE session of two broad USAF development programs in these areas upheld the stature of American engineering accomplishment in the face of strong competition from the British develpoments. Key discussions concerned:

• **Supercharged turboprops**—Dr. S. G. Hooker, Bristol engine division director, said the B.E. 25 engine, slated for first running in September-October of this year, will better the fuel economy of the best piston engines by offering a specific fuel consumption of 0.37 lb/hp/hr.

• **Vickers Viscount**—J. T. Dyment, Trans-Canada Air Lines' engineering director, told SAE that, despite some "bugs," its Viscounts have given less initial trouble than any other airplane TCA has operated.

• **Boundary Layer Control**—ARDC's Joseph Flatt unveiled hitherto classified data on two Air Force BLC projects—a leading edge suction system on the North American F-86 and a combination suction-blowing system on the Fairchild/Chase XC-123D.

• **Military Transports**—Air Research & Development Command's Capt. R. D. Cousins disclosed first details of USAF's 4-phase turboprop development, including new data on projects involving the Republic XF-84H, Douglas XC-132 and XC-133A designs.

Bristol's B.E. 25

Marked superiority of Britain's newest jet engine development, Bristol's twin-spool, supercharged B.E. 25 (AMERICAN AVIATION, Dec. 6), over conventional turboprop designs was evident in data presented SAE on its anticipated performance in the Bristol Britannia compared to the standard Proteus 755 turboprop.

With the Britannia cruising at 30,000 feet at a true airspeed of 360 mph, the B.E. 25 will produce 3,500 total equivalent horsepower against 2,000 hp for the Proteus. At the same time, specific fuel consumption of 0.50 for the Proteus drops to 0.405 for the B.E. 25.

Effect of the 75% hike in cruise power offered by the new engine results in a speed in excess of the 0.63 Mach limitation of the Britannia wing design and full cruise power of the B.E. 25 cannot be used.

"Almost for the first time in history," said Hooker, the Britannia/B.E. 25 combination offers a transport airplane with excess power available. There will be no question of "scraping

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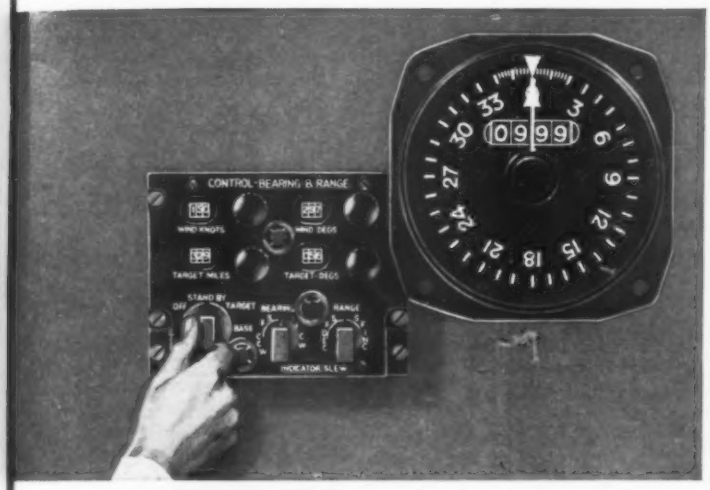
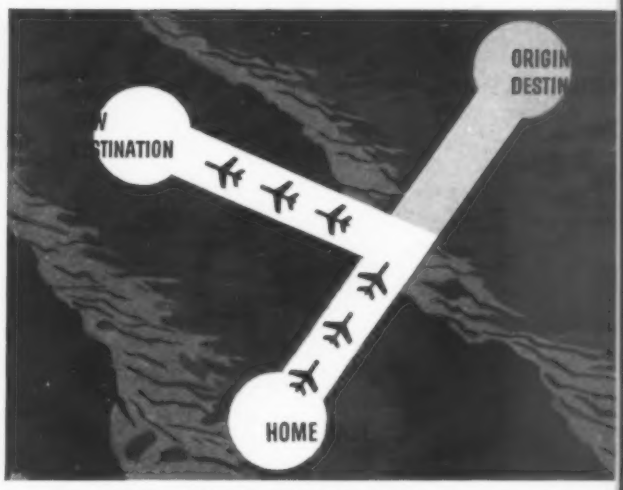
WHY *Bendix* BEARING AND RANGE INDICATOR SYSTEM IS "ON TARGET"

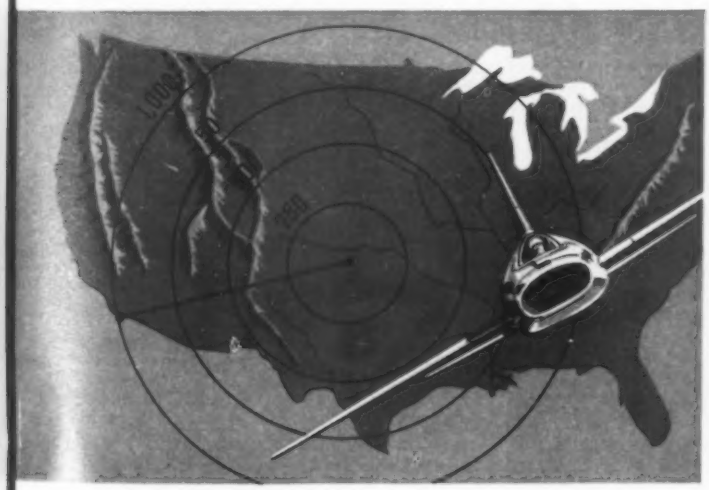
WHEN IT COMES TO MODERN FLIGHT REQUIREMENTS



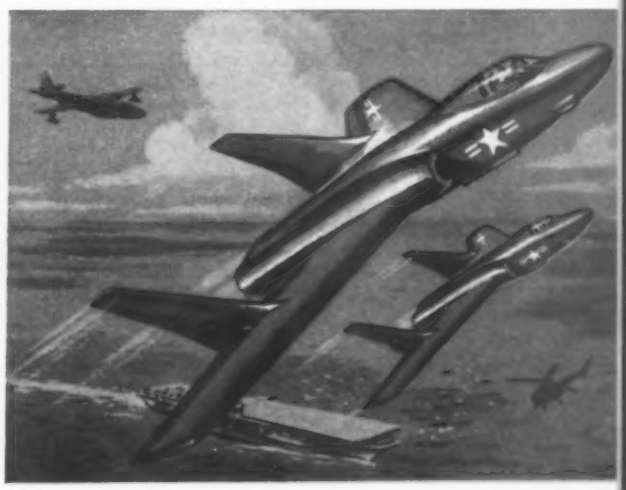
1 SIMPLICITY ITSELF! At take-off, pilot sets distance and bearing of destination . . . plus wind force and direction . . . into control panel. During flight, the indicator shows ground track and miles remaining to destination. Twelve o'clock pointer reading means "on course."



2 RE-SETS INSTANTLY! If destination—or target—is changed during flight, pilot simply sets new data into control panel. He gets correct new bearing and range reading . . . instantly and automatically . . . from his modern, self-contained, dead-reckoning Bendix Indicator System.



3 LONG RANGE! The Bendix Bearing and Range Indicator System has an effective operating radius of 1,000 miles . . . more if a new "home base" can be picked up as a reference. System accommodates true air speeds from 100 to 1200 knots and wind speeds up to 200 knots.



4 SUITED TO ALL AIRCRAFT! Because it can be tailored to any compass or true air speed system, the Bendix Bearing and Range Indicator is flexible enough to use in any aircraft. Its extreme compactness and light weight make it particularly suitable where size and weight allowances are at a premium.

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the bottom of the bucket" for an odd 100 hp and the surplus power will prove of great advantage in event of one or more engine failures en route.

TCA's Viscounts

Trans-Canada may not agree 100% with all the design details that went into its new Vickers Viscount transports, but one thing is certain: TCA is happy with the turboprops.

Dyment told SAE that TCA prefers the American multi-spar type of wing design compared to the Vickers monospar, that the Viscount doors are unnecessarily large, and that its landing gear geometry leaves something to be desired in not providing free-fall and lock features.

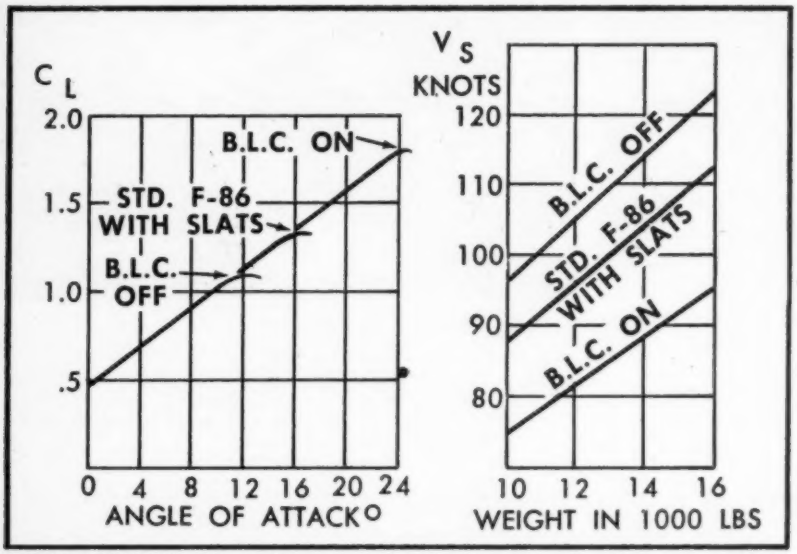
But discounting these odds and ends of design philosophy, his liking for what's good in the Viscount far overshadowed his dislikes. Biggest area of favor is its cockpit design, a layout developed by TCA from a mockup provided by Vickers.

The current Viscount cockpit, with 145 fewer controls, switches, warning lights and instruments is "head and shoulders above the simplest 4-engine cockpit in the business" Dyment feels. As an outgrowth, the airplane is either "so normal or so simple," TCA found that a pilot indoctrination schedule of only two weeks ground school and 15 hours flying was sufficient for transition from North Stars and Viscounts.

This trend toward cockpit simplification in turbine aircraft should give rise to new CAB consideration of basic requirements for flight engineers, Dyment contends. Future needs should be based on cockpit design—not gross weight. He states that TCA's North Star is simpler to fly than its contemporaries, and the Viscount is even simpler —and neither needs a flight engineer.

Boundary Layer Control

USAF's first revelation of Wright Air Development Center's research activity into improved airplane performance through boundary layer control experiments gave SAE members some tangible idea of what to expect in future aircraft designs. WADC's Flatt gave these performance details on projects to date with North American XF-86F and XC-123D installations:



NORTH AMERICAN F-86 performance with and without boundary layer control. Chart shows lift coefficient vs angle of attack. Stall speed variation with gross weight is plotted at right.

• **XF-86F**—First flight on September 18, 1953, followed four years of research both at WADC and at National Advisory Committee for Aeronautics Ames Laboratory. Subsequent NACA flight testing has shown that the leading edge suction system installed produces a 23% reduction in stall speed from 114 knots to 88 knots when operated at 14,000 lbs. gross.

Comparative performance in terms of lift coefficient versus angle-of-attack (see chart) shows that with BLC off, the maximum lift coefficient of 1.1 was obtained at a 12° angle of attack. With the new system operating, a lift coefficient of 1.8 was obtained at a 24° attack angle.

• **XC-123D**—USAF experience in current flight testing of a modified Fairchild/Chase C-123 assault transport indicate the same encouraging results, Flatt told SAE.

Following basic research by Cornell Aeronautical Laboratory on the original combined blowing/suction system of the German Arado 232A heavy transport system. USAF contracted with Chase Aircraft Co. for a compound BLC system design for the C-123, and more recently with Stroukoff Aircraft Corp. for construction of the test airplane. First flight took place on December 7, 1954, and complete flight evaluation is now in process at WADC.

Although the program is now in its early stages, Flatt said preliminary figures show that the XC-123D takeoff distance at a gross weight of 50,000 lbs. is reduced from 1950 to 850 feet. Landing system at the same weight (see chart) has been cut from 1,200 to 775 feet, slicing its minimum required field size almost 50% by use of boundary layer control.

USAF Turboprops

USAF's turboprop program, Cousins told SAE, is a 4-phase project.

• **Phase One,** the initial investigation, dates back to 1945 to flight testing of the Convair XP-81 powered by a General Electric TG-100 turboprop forward and a G-E I-40 jet mounted aft on the low wing fighter. The project was abandoned after 30 hours flying due to inability to control the propeller and turbine speeds.

• **Next step,** Cousins disclosed, brought USAF contracts to McDonnell Aircraft Corp., Republic Aviation Corp. and Boeing Airplane Co. for installation of advanced turboprop engines and propellers in modified F-88, F-84 and B-47 aircraft.

The XF-88 powered by an Allison T38 in addition to its J34 jets first flew in early 1953 and was turned over to the National Advisory Committee for Aeronautics last year for investigation of high speed propeller performance.

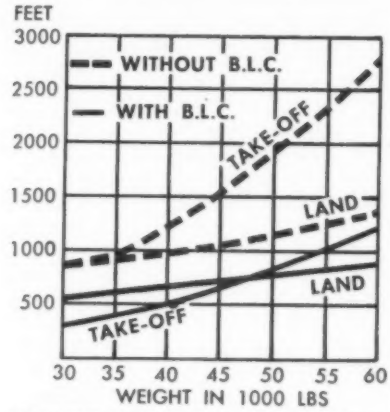
Before its delivery to NACA, it reached speeds of Mach 0.97 to 1.0 in moderate dives at full turboprop engine power. However, on the XF-88, both lateral and longitudinal stability were found to be reduced about one-third by addition of the propeller.

The Republic XF-84H, now undergoing ground tests and propeller vibration studies at Edwards AFB, is powered by the Allison T40. It will be used as a supersonic propeller research vehicle for possible future design of an all-purpose turboprop fighter and fighter-bomber airplane.

Last airplane in this phase is Boeing's XB-47D flying test bid for the Wright YT49 turboprop, rated at close to 10,500 equivalent shaft horsepower. First flight is expected this month and the airplane will prove or disprove the feasibility of high-speed, long-range composite bombers using both jet and tuboprop engines.

• **Third phase** in the AF project called for fitting of turboprops to established commercial airline transports: installation of Allison YT56s in two Convair 340s, and Pratt & Whitney T34s in two Boeing C-97s and Lockheed Constellations. Official designations are the YC-131C, YC-97J and YC-121F, and all will eventually be assigned to the Military Air Transport Service for use in actual MATS operations.

Flight tests of the first of this group, the Convair YC-131C, showed a marked improvement in performance over the standard piston-engine Convair. Take-off distance to clear a 50-ft. obstacle was only 1,680 ft. compared with



HOW BLC cuts takeoff and landing distance on Fairchild/Chase XC-123D.

2,130 standard; rate of climb at sea level was 2,550 feet per minute against 1,240 for the 340, and at 25,000 ft. the respective figures were 780 fpm and 200 fpm.

• **Last phase** of the project, AF development of new turboprop aircraft involves the Douglas XC-132 and XC-133 and the production of the Lockheed C-130 Hercules.

Mission of the XC-132, which is powered by four Pratt & Whitney XT57 turboprops, will be to provide a transport with very heavy maximum design gross weight to move military supplies from major depots in the U.S. directly to overseas theaters.

The Douglas XC-133A will use four P&W T34-P3 engines and have a maximum gross weight of 255,000 pounds. It will serve as a long-range logistical carrier transporting cargo only.

Lockheed's production C-130, Cousins said, will use about two-thirds less runway for take-off than any current piston engine transport of equivalent gross weight. Two prototypes have flown more than 50 hours and production aircraft are slated to go to Edwards AFB for evaluation in August. • • •

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Hawker Siddeley: British Aviation Empire

BY JAMES HAY STEVENS

London

THE HAWKER SIDDELEY GROUP is the largest empire in the British aircraft industry and in the financial year to July 31, 1954, recorded a net trading profit of $19,490,915. The Group comprises manufacturers of materials, airplanes, engines and also one operator (see box).

HAWKER-SIDDELEY GROUP COMPANIES

Airplane Constructors:
Sir W. G. Armstrong Whitworth Aircraft Ltd.
Avro Aircraft Ltd.
Gloster Aircraft Co. Ltd.
Hawker Aircraft Ltd.
Hawker Aircraft (Blackpool) Ltd.
A. V. Roe & Co. Ltd.

Engine Manufacturers:
Armstrong Siddeley Motors Ltd.
Brockworth Engineering Co. Ltd.
Orenda Engines Ltd.

Materials:
Canadian Steel Improvement Ltd.
High Duty Alloys Ltd.

Operator:
Air Service Training Ltd.

Miscellaneous—and Industrial:
Hawksley Constructions
Kelvin Construction Co Ltd.
Norstel Ltd.
Templewood Engineering Company, Ltd.
Aluminum Wire & Cable Co. Ltd. (33⅓% interest)
Self Changing Gears Ltd. (33⅓% interest).

In addition to the productive, or executive, companies there are two holding companies: the Armstrong Siddeley Development Co. Ltd., in England, and A. V. Roe Canada Ltd. —and, of course, there is the central directive and organizing Hawker Siddeley Group Ltd. with offices in St. James' Square, London.

• **The Group,** which controls the individual companies, directs the general policy, avoids overlapping and canalizes effort so as to make the most of the vast floor space, machine-tool facilities and labor pools in different parts of the country which the constituent companies represent. A good example of Group handling was the transfer in 1953 of the production (including jigs and fixtures) of the Sea Hawk from the Hawker plant in London to that of Armstrong Whitworth at Coventry.

AVRO VULCAN, the Hawker-Siddeley Group's jet bomber.

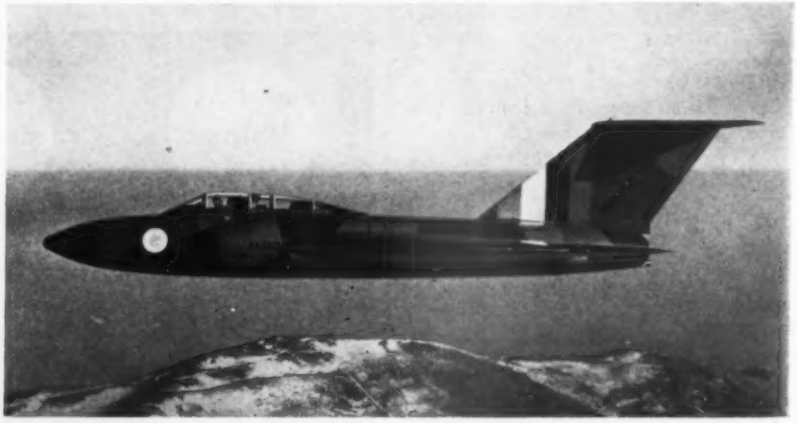
This move was made to clear the way for extra Hunter lines to meet the increased NATO commitments ensuing from U. S. off-shore procurement orders. Design responsibility for modifications was also transferred to Armstrong Whitworth, which now "fosters" this airplane with the Royal Navy.

A somewhat similar situation arose soon after the end of World War II, when Gloster Aircraft was fully occupied with development and production of the single-seat Meteor fighters. The two-seat night-fighter version was passed to Armstrong Whitworth, whose design office was, at the time, less fully occupied. In a more general way, component manufacture is spread around the plants of the Group to keep production loading as even as possible, or to meet special high output rates when required.

Despite this central control of policy, the individual companies preserve their autonomy in the conduct of their affairs. Design and production are controlled by each company just as if it were an entity, but should, for example, special research be required, it can call upon the resources of any company within the Group.

• **The origins of Hawker Siddeley** date back to the pioneer days of British aviation. The present Group chairman, Sir Thomas Sopwith, was a wealthy young man who learned to fly and founded his own airplane manufacturing company before World War I. He was joined by the late Harry Hawker, Fred Sigrist and Frank Spriggs in the 1913 Sopwith Aviation & Engineering Company, which was to produce some of the most famous scouts of World War I, among them the Pup, Camel, Dolphin and Snipe.

After that War the company was re-formed and re-named after Harry Hawker. Specializing always in single-



GLOSTER JAVELIN all-weather fighter is one of the most important aircraft produced by Hawker-Siddeley component companies.

"Big Stick"... jet age version

TEMCO HELPS BOEING BUILD B-52 "RETALIATION" FLEET

Thunder of the Stratofort's eight jet engines is heard clearly at conference tables today, for this sleek giant can, by refueling in flight, strike with an H-bomb load at any point on earth. The threat of this fearful retaliation is impossible for an aggressor to ignore. The Air Force has ordered a fleet of these planes and they will have performed their mission to perfection if they never have to drop a bomb in combat.

Producing planes fine enough to preserve the peace is an awesome responsibility for our aircraft industry. Boeing-Wichita, in starting second source production, called confidently upon TEMCO to produce a major component of the vital B-52, for previous Boeing subcontracts on the B-47 Stratojet had firmly established TEMCO's reputation for producing a quality product, on schedule, at the lowest possible cost.

Tooling up for the B-52 job, these TEMCO workers are building the huge jigs in which major fuselage sections will be fabricated.

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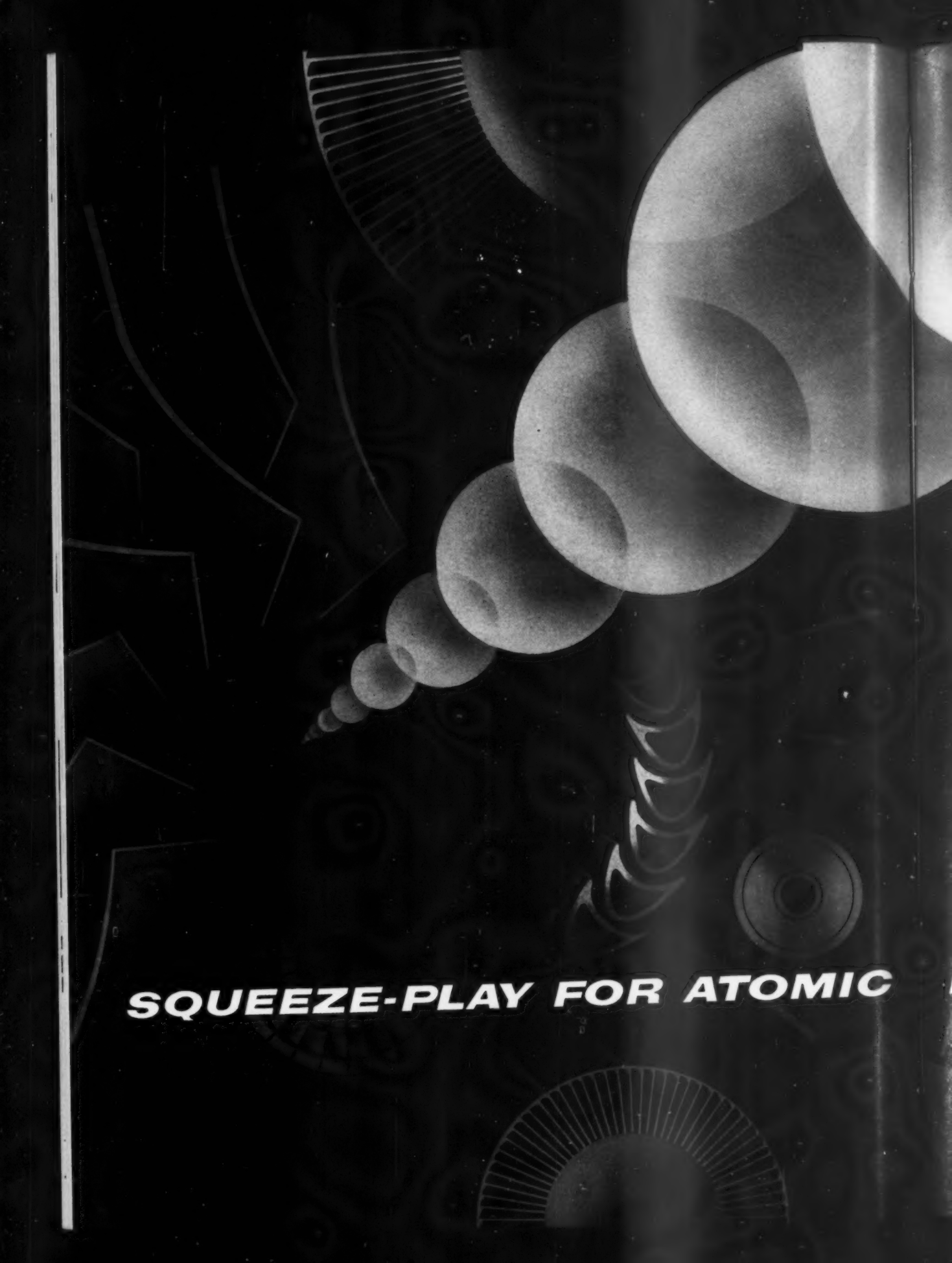
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Then, to build the units in mass-production quantity, Fairchild constructed an entirely new plant and trained more than 1,400 employees in the operation of complex precision machinery. The products now being delivered by Fairchild represent a major advancement in compressor design and development.

This is only one part of Fairchild Engine Division's story of powerplant and equipment development. Pioneers in powerplant production, Fairchild stands ready to provide aircraft engines, underwater weapon systems or other high-performance, precision-built products —wherever they may be required, to perform new and challenging functions.

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seaters, there has been a Hawker fighter with the R.A.F. almost continuously for more than 30 years—Woodcock, Fury, Hurricane, Typhoon, Tempest, Hunter.

Spriggs, now Sir Frank and managing director of the Group, was the moving spirit in expanding the organization and bringing in the other companies one by one. This movement started in 1934 when Hawker acquired Gloster and was consolidated when Armstrong Siddeley, Armstrong Whitworth, Avro, High Duty Alloys and AST were bought in 1935 and Hawker Siddeley Aircraft Ltd. was formed. The present structure, with the policy-making Hawker Siddeley Group at the top, dates from 1948.

Of the airplane and engine companies, A. V. Roe, named after its founder the first Britisher to design and fly his own airplane, is the oldest. Sir Alliott Verdon-Roe has not, however, had any connection with it since it was absorbed into the Group. Armstrong Whitworth and Armstrong Siddeley Motors were evolved from the original

ORENDA jet made in Canada by the Hawker-Siddeley's Orenda Engines Ltd.

Armstrong Siddeley automobile company, which built airplanes and engines during World War I. Gloster Aircraft was a World War I company making license-built airplanes which, between the wars with the late H. P. Folland as designer, made a name with its single-seater fighters.

A large percentage of the Group's activities and revenue are non-aviation. Items include the Armstrong-Siddeley Sapphire luxury automobile, aluminum pre-fabricated houses, schools, etc., steel-frame buildings, diesel engines, grass driers and agricultural machinery. These activities insure maintenance of Group income should there be an armament recession.

Tabloiding the present activities of the aviation companies in alphabetical order:

AIRPLANE MAKERS

• **Sir W. G. Armstrong Whitworth Aircraft Ltd.,** Coventry, England, is not at present in production with an airplane of its own, but has had full design responsibilty for developing the long-nosed two-seat night fighter Meteors, the NF 11, NF 12, NF 13 and NF 14 as well as building them in quantity for the R. A. F. AW built

HAWKER HUNTERS represent Hawker Siddeley's major manufacturing program at this time.

the Hawker Sea Hawk in quantity, and now has design modification responsibility for it, and has also a Hawker Hunter 2 line going.

Airplane design and research since World War II has included the Apollo turboprop airliner and the AW 52 flying wing with boundary layer control. An intensive supersonic tunnel research program—transonic and supersonic equipment is said to be the best in the industry—has also been carried out both on airplane and missile models. Rocket missiles are under development and one, with concentrically-mounted boosters, has been shown at Farnborough. The company operates a missile-testing base at Woomera, Australia.

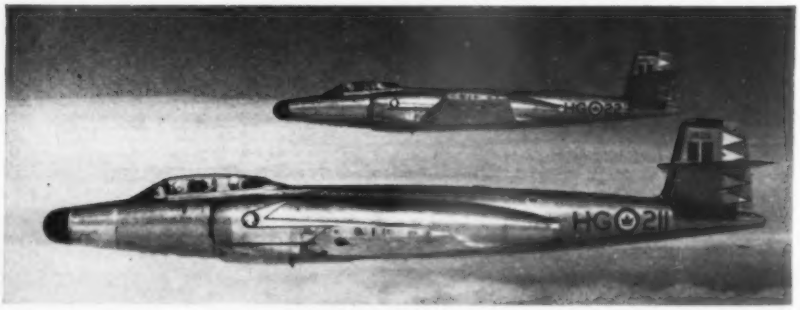
• **Avro Aircraft Ltd.,** Toronto, Canada, has mushroomed from the Malton plant of the government-owned Victory Aircraft, bought by the Group in 1945. The company has been criticized because of delays in getting its first production design, the CF-100 all-weather fighter, into service, but the overall picture compares well with the efforts of old-established companies making similar airplanes. The only unswept service airplane with a wing thin enough to let it pass Mach 1 in a dive, the CF-100 yet has a larger internal fuel capacity than any other all-weather twin.

Avro Canada also got away smartly with the CF-102 Jetliner. The CF-105, a delta-wing replacement for the CF-100, is a very advanced design expected to fly next year. Early in 1955 a hundred-man missile study and design group was formed. The Canadian Board of Avro Aircraft, now under the policy control of A. V. Roe Canada Ltd., is also subject to authority from the Hawker Siddeley Grouu in London.

• **Gloster Aircraft Ltd.,** Gloucester, England, (headed by Hugh Burroughes, deputy managing director of the Group) has had a good 10-year run with over 3,000 Meteors for the R.A.F., Australia, Argentina, Belgium, Brazil, Denmark, Egypt, Holland, Israel, Syria and France. Old-fashioned though it now is, the Meteor was the first airplane to take the speed record above 600 mph and was the only Allied jet to go into action in World War II. As an example of Group co-operation, when Meteor output was at its peak every factory was making some components for it.

The all-weather delta Javelin now be-

CF-100, the all-weather fighter produced by Canadian manufacturer Avro Aircraft Ltd.



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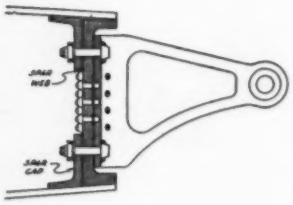
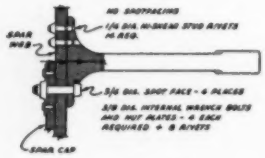
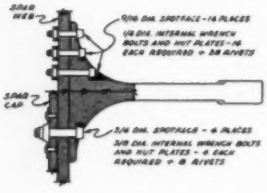




Excessive spot facing, weight, and bulk are eliminated from removable fittings such as aileron hinge brackets, when HI-SHEAR stud rivets are used to carry the shear loads. On the above example four bolts speed up removal or installation of the fitting in the shop or on the flight ramp.



Fittings using bolts to carry the shear loads, require spot facing in fillet areas. These fittings must be heavier in weight to retain strength to avoid stress concentration and are larger in size to obtain bolt clearances. In example, the fitting with bolts suffers a weight increase of about 30% and requires removal or installation of an additional fourteen bolts.

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Production

ing phased in at the Hucclecote plant is the Meteor NF replacement and its size reflects the greatly increased weight of the new radar gear. The Javelin has exceeded Mach 1 in a dive despite its large size and somewhat thick wing.

In British Parliament, reference has been made to a new version with a thin wing and more powerful engines—which should be level supersonic. Parliamentary criticism further credited the Javelin with an internal fuel capacity of only 800 gallons—which can be supplemented by bosom tanks under the engines. Two Javelins have been lost in circumstances suggestion a low-speed "mush."

(The highly-swept wing could be subject to tip-stall and lift-loss at high incidence. But the delta planform might prevent wing-dropping, instead there would be a forward movement of the centre of pressure causing nose pitch-up. Again, the large wing at high incidence may well blanket the tail plane and elevator, so making it impossible for the pilot to correct. The forward set of the landing flaps—to reduce trim change

Spriggs

Sopwith

when lowering—could well make them useless as an emergency correction for the pitch-up.)

Glosters say production is up to schedule and the R.A.F. is apparently looking to form a squadron this year.

• **Hawker Aircraft Ltd.** has all its energies at present concentrated on the Hunter, which is being built in the plants at Kingston-upon-Thames, Langley, Slough and the flight sheds at Dunsfold, all near London, as well as the re-opened wartime factory at Squires Gate operated by the associated Hawker Aircraft (Blackpool) Ltd. Tooling has been on the basis of a high war emergency output that would keep the fighter squadrons of the R.A.F. fully supplied, although actual deliveries are controlled to spread the work over an economical period.

After the War, the Hawker design team under Sir Sydney Camm evolved the straight-wing centrifugal Nene (J48) engined P-1040 which flew on September 3, 1947 and has since become the Royal Navy's Sea Hawk, procured in part by U. S. funds. A swept wing on the P-1040 made the P-1052 in November 1948 and in June 1950 a new rear fuselage was fitted to eliminate the bifurcated jet pipe and allow fitment of an afterburner. This was, the P-081, licensed by Australia for production by the Commonwealth Aircraft Corporation and then cancelled in favor of the Avon-Sabre. Toward the end of this development Sydney Camm tore up his drawings and started again with a 40° swept airplane, tailored to the new Rolls-Royce Avon axial, the P-1067.

This became the Hunter, ordered off the board by the Socialist administration late in 1950, which first flew on July 20, 1951 and to which the present Conservative government gave Super-Priority for large numbers in November 1951. Since then NATO has approved the Hunter and it has been heavily backed by U.S. funds (to the tune of around $100,000,000) for production in Europe as well as the UK.

Unfortunately, the Ministry of Supply let itself be over-ruled by the Treasury when ordering prototypes and production airplanes were coming off the line before service pilots had given the Hunter a full operational shake-down.

Result was that, although pilots all agree it is a mooth performer at all speeds and remarkably docile for a swept jet, it had serious operational drawbacks. Possibly because it was so smooth and could dive through Mach 1 without excessive trim change, a powered tail was not fitted. This is needed, however, for formation flight above Mach 9—and it is coming. Wind tunnel work led to the use of trailing-edge flaps as air brakes—a gap between their leading-edges and the wing made this possible—which were excellent for general maneuvering but caused a trim change that upset gun sighting. Rear fuselage "doors," like the Sabre, made the airplane uncontrollable and, eventually, the external ventral brake was designed and is now being fitted. Third snag was flame blowout in the stratosphere when the four 30 mm. Aden guns were fired.

This was a surprise, with the gun ports so far ahead and below the wing-root air intakes. It is not serious with the Armstrong Siddeley Sapphire in the Hunter 2. A minor armament snag was the collecting of the steel belt links, which was originally to have been in long boxes under the fuselage, but will now be internal. The Ministry claims that all these problems have been solved and that production airplanes will soon be coming off the lines in a fully operational state.

With about 200 Hunters delivered in 1954, output is healthy and fully up to cold war requirements.

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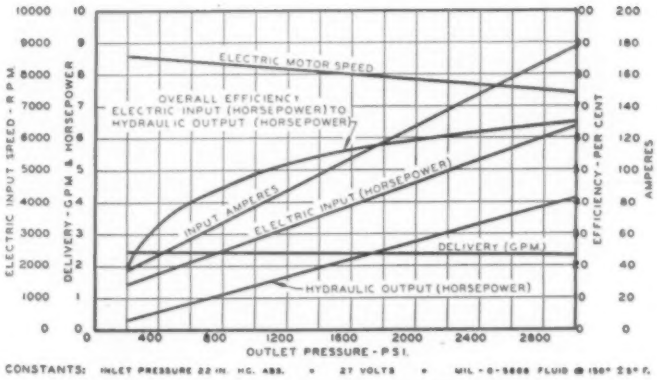
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Production

• **A. V. Roe & Co. Ltd.,** Greengate, Manchester, participates in the Super-Priority V-bomber program with the delta-wing Vulcan. The Air Staff specification of 1946 to which the Vulcan was designed called for a bomber that would be capable of striking into the heart of Russia from England, and which would be in full squadron service by 1957—the earliest anticipated date at which World War III could be launched by the East.

The Avro design team under "Cock" Davies investigated various approaches and eventually chose the delta—then untried in flight—as giving the low wing loading, low form drag (with large internal stowage), and lightness of structure needed for 600 mph plus cruising at 50,000 feet. A one-third scale-model program with the Avro 707s was planned and carried out to give the flight background. The Vulcan was designed around the two-spool 10,000 pst Bristol Olympus, but first flight was made with Avons on August 30, 1953.

Later this airplane was fitted with Armstrong Siddeley Sapphires, while the second airplane flew on September 3, 1953 with Olympus. Extensive equipment changes necessitated a major fuselage alteration and the first pre-production airplane flew in February this year. Fairey envelope jigging was used to speed manufacture of the two prototypes and is, presumably, being continued in production.

Rumor says the Vulcan is shaping well, despite a serious landing accident and some minor teething troubles. The delta planform gives a large stowage volume for fuel, and engines, even with a low thickness-chord ratio. The latter, plus a leading-edge sweep of 60° gives a potentially high critical (compressibility drag-rise) Mach number. The low wing loading, of course, keeps the cruising incidence low at great heights and speeds (where the CL falls off) and compensates for the high induced drag of the low aspect ratio—or so the designers say. There are repeated rumors of a thin-wing Vulcan with podded engines, which would be logical if a faster version were wanted.

Avro is also building Shackleton marine reconnaissance airplanes for Coastal Command, RAF and the South African Air Force. Canberras, too, have been built at Greengate as part of the interim Bomber Command re-equipment program. Avro has been doing a lot of work on honeycomb sandwich construction and claims to have evolved an economical and producible system.

In his annual general meeting speech on January 5, Sir Thomas Sopwith announced that a Weapons Research Division had been formed.

AIRCRAFT ENGINE MANUFACTURERS

• **Armstrong Siddeley Motors Ltd.,** Coventry, England, is making turboprops, turbojets and rocket-motors. The Sapphire turbojet (licensed as the Wright J65) has a particularly good reputation for maintaining power at great heights and not being subject to surge, nor to flame blowout in yawed airflow—despite its single compressor. The Sapphire is in full production at the Brockworth Engineering Co., Ltd., Gloucester, for the Hunter 2, Javelin and Handley Page Victor. The Sapphire 6 is rated at 8,300 lbs. thrust and the Sapphire 7 at 10,200 lbs.

The Mamba and Double-Mamba axial turboprops are in production for the Fairey Gannet and the Short Seamew. Both are available for civil use and, though the design dates from just after the war, it offers a useful 1,500 shp. single or 3,000 shp. twin unit with a low specific. These engines are cleared for flight on marine diesel oil.

The 4,110 shp. Python turboprop is an early design with reverse-flow combustion that has been kept alive for the Westland Wyvern strike airplane. The 1,640-lbs.-thrust Viper was originally a short-life turbojet for target airplanes, but has now been developed as a trainer powerplant. It has been flight tested at high altitudes as a wing-tip pod on a Canberra and has been used with success in the Hunting-Percival Jet-Provost and the Folland Midge. A license agreement exists with Marcel Dassault of Paris.

Very little is permitted to be said on the activities of the Rocket-Motor Division. The 2,000-pound thrust Snarler has been operating for some years and has been flight tested in the Hawker P.1072 (a modified Sea Hawk. Combustion is of a methanol/water and liquid oxygen with the airplane's normal kerosene or wide-cut fuel. An Armstrong Siddeley throttleable rocket of very high power is known to exist and the company possesses an exceptionally good test facility, since it is a prime developer of these motors for the MoS.

• **Orenda Engines Ltd.,** Malton, Ontario, Canada, is principal supplier of jet engines to the RCAF, both for the Avro CF-100 and the Canadair Sabre 5 and 6. Again security restricts details to a statement that it weighs 2,685 lb. and gives "over 6,500 pst."

MATERIAL SUPPLIERS

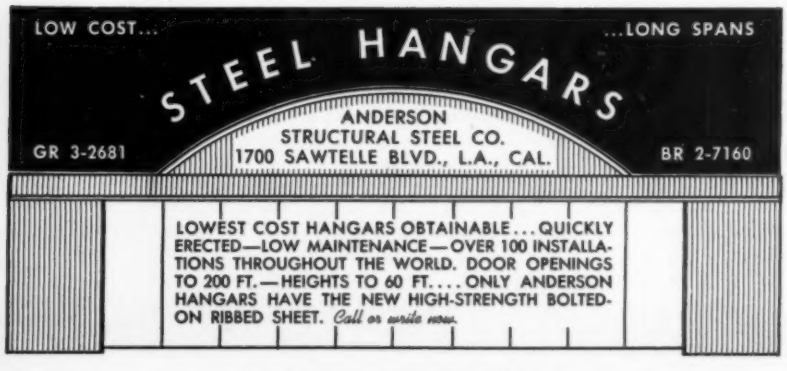
• **Canadian Steel Improvements Ltd.,** Toronto, added to the North American branch of the Group last year, although not as yet a large company, has one of the most up-to-date plants for production of steel, light-alloys and titanium. The last-named aspect is to be the subject of special concentration, using the abundant Canadian titanium-oxide sources. Already a noted supplier of close-to-form forged compressor blades, the company's capacity is being expanded by the installation of a large light-alloy foundry.

• **High Duty Alloys Ltd.,** Redditch, England, is one of the biggest light alloy producers in the UK. It makes raw stock of all descriptions, sheet, plate, billets, extrusions, forgings and castings. It has the largest forging press and drop hammer shop in the country.

OPERATOR

• **Air Service Training Ltd.,** Hamble, England, runs a school for training pilots, navigators and engineers. A large part of its activities was the training of aircrews, for the RAF and RN, but this was cancelled under the Air Staff policy of longer service in the all-jet air force. AST continues to function for training of civilians, 70% of whom come from abroad, mainly the East. The company also operates technical training schools in India and Pakistan.

AST has a manufacturing division, which does subcontract work on airframe components and drop tanks. It has also designed and built a high-speed tow target. • • •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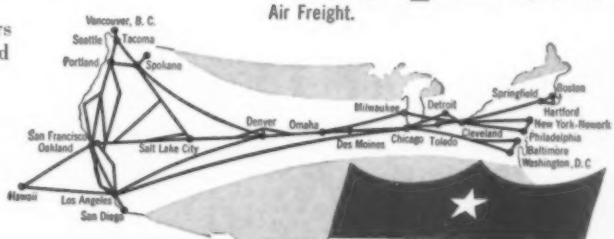

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Airborne Radar Gets Boost from UAL

Purchase of C-band Units is Major Step Toward Safer, More Comfortable Bad Weather Flights.

By HENRY P. STEIER

A MAJOR STEP toward more efficient, safe and comfortable all-weather commercial air transport operations was made with United Air Lines' decision to order 200 C-band airborne weather mapping radar units for fleet installation.

United's projected outlay of $4 million for radar equipment and required airframe modifications is a significant step in the long history of radar weather mapping development, and 10 years of airline evaluation.

Placement of "the largest order for airborne radar in the history of commercial aviation" with the Radio Corporation of America, announced by United's president W. A. Patterson April 5, 1955, came as a surprise to industry observers, and United's operations and engineering staffs who expected their recommendation for purchase of Bendix's C-band system would be recognized by United's board of directors.

A contract drawn to award Bendix the $2.5-million order was shelved in what appeared to be last minute decision by United's board. In releasing the information, United said, "More than three months of intensive research by United and RCA engineers into the potentials of C-band airborne radar . . . preceded United's decision to select that frequency."

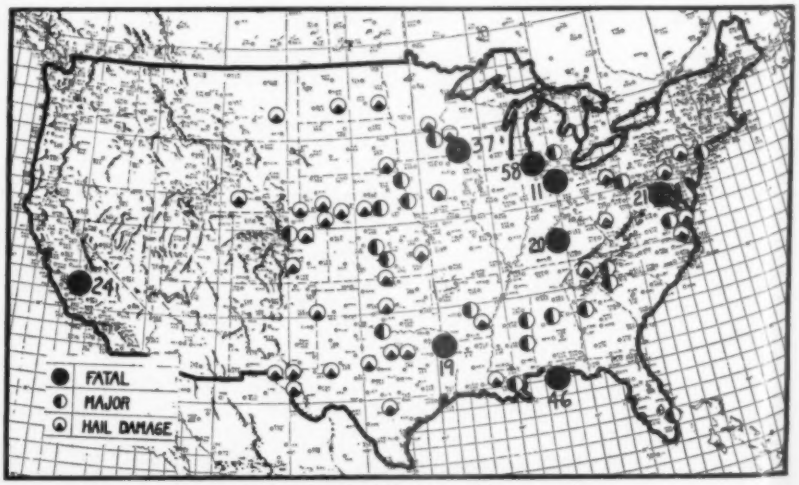
United's weather radar evaluation report of March 1954 indicated "a contract was placed with RCA in October 1952 for an experimental unit" to be carried in a DC-3 test plane nicknamed "Sir Echo."

• **Entrance of RCA** into the big competition as a major supplier in this field of aviation electronics now forms a "big three" of known contenders for commercial airline weather radar business. Both RCA and Bendix have units under test or in operational use by airlines and in business aircraft. Collins Radio expects to have a weather mapping unit out of its laboratory for evaluation "early in 1955," and tentative specifications call for lower equipment weight than other available equipment, together with a 20 per cent reduction in vacuum tube count.

• **Pushing evaluation of RCA's** AVQ-10 C-band equipment are Braniff Airways, National Airlines, Pan American World Airways and Trans World Airlines. TWA's Super Constellations being built are wired with provision for radar, but the line still is evaluating and will soon get a C-band unit from Bendix. United is reported to plan first installations in its Convairs, to be followed in DC-6s and then DC-7s.

• **First airline** to make a decision to equip its new planes with radar was Pan American-Grace Airways, Inc., which early last year installed a Bendix X-band unit in one DC-6B and have since been operating it on regularly scheduled flights between Miami and Buenos Aires.

Panagra has six more X-band units for installation in their new DC-7s being built. A spokesman for Panagra told



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FIRST Turbo-Prop powered aircraft delivered to a U.S.A.F. operating unit are rapidly accumulating time and experience with the Military Air Transport Service. Assigned to the newly established 1700th Test Squadron at Kelly AFB two Convair YC-131C airplanes spend hours in the air over San Antonio, Texas and en route to MATS bases on east and west coasts.

The twin-engined aircraft are powered by Allison YT56 Turbo-Prop engines and Aeroproducts propellers.

With flight records of 10½ hours on one aircraft in a single day, the crack pilots and ground crews of the 1700th are rapidly becoming aviation's most enthusiastic boosters for Turbo-Prop power.

This Air Force flight testing carries forward a Turbo-Prop flight test and evaluation program begun almost five years ago when Allison began flying another Convair passenger-type airplane powered by earlier model T38 engines. This airplane has also been used extensively for demonstration purposes and has made more than 600 flights, carrying approximately 3600 passengers.

To date, Allison Turbo-Prop engines have powered in flight 21 aircraft of 9 different types—all independent of any other power. This is more experience with Turbo-Props than the total for all other U. S. Turbo-Prop engines.

It is superb background for introduction to commercial service of the new Allison Model 501 Turbo-Prop engine. The T56, its military counterpart, will have accumulated two years of production and operating experience prior to commercial availability for regularly scheduled passenger service.

These new Allison Turbo-Props, for both military and commercial use, reflect the knowledge Allison has gained in designing and building gas turbine engines that have flown more than five-and-one-half million hours. These engines are daily flying the equivalent of one hundred trips around the world—*experience where it counts most —in the air.*

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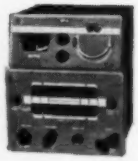
This 2½ pound "pancake-designed" Omniplexer can be plugged into any existing Simplexer to give accurate Omninavigation. Dual function left-right/to-from indicator contributes to compactness; vernier control assures accurate course selection.



The Omniplexer/Simplexer combination provides a perfect navigation and communication package and permits addition of dual Omni at surprisingly low cost.

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Electronics

American Aviation that their 3.2 cm X-band radar had proved "very satisfactory in operational use over a one-year period" and that "X-band radar suits Panagra's operational need with complete satisfaction." Continental Air Lines will equip its entire fleet with either Bendix or RCA radars.

Other X-band orders from Bendix for operational or evaluation purposes are:

- KLM—two units on order.
- Northwest—two on order.
- Business aircraft—four installed.
- PAA—one installed.
- National—two installed.

The Bendix stand on the C- or X-band issue is that choice of frequency depends upon the operational requirements of the user and the nose configuration of the aircraft, and Bendix has fully developed radars for both bands.

• **Radar beamwidth,** which is a product of antenna size and frequency, determines the defining limits of the beam sent out by the radar. For users who want to use their radar for ground mapping as well as obtain sharp definition of storm cells on their viewing "scopes," and who have a limited area for the antenna dish in the nose configuration of the aircraft, the higher (9350 megacycles) X-band will do the job.

Bendix's RDR-1B X-band unit also provides operation of the airborne radar with the ground radar beacon Racon System. Ground stations are identified by the number and position of the pips on the scope. Ability to interrogate the airborne transponders from radar beacons promises to be an increasing aid to air traffic controllers and pilots as implementation of the beacon program progresses.

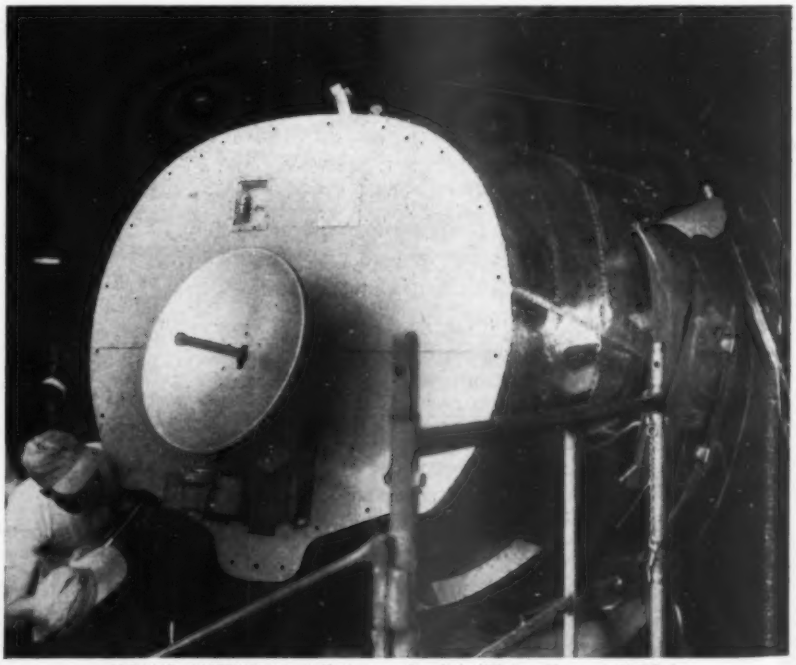
RACON BEACON installations in U. S.

• **Backed by** ARINC and ATA, C-band radar is characterized by its lower frequency (5400 megacycles) which can penetrate to the "hard core" of storm areas not penetrated by X-band beams, and which permits positive location and avoidance of the areas of highest rainfall gradient where turbulence is greatest, where possibility of hail damage exists, or tornadoes are present.

CAA's summary for 1954, to be published soon, will show that in 1954 five "serious" passenger accidents were caused by severe turbulence. This is over 12% of the 40 major mechanical and passenger accidents that occurred during 1954.

Between 1938 and 1953, there were reported, in CAB records, eight fatal, 18 major, and 35 hail damage accidents attributed to thunderstorms encountered by airline planes.

While the weight (C-band: RCA—114.8 pounds; Bendix—128 pounds) and



X-BAND ANTENNA installation on Bendix's "Flying Showcase" DC-3.

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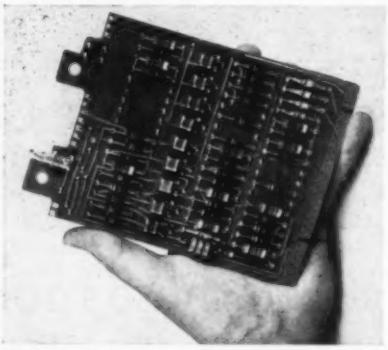
power supply space required for radars probably will be a deterrent to installation in local service carrier DC-3s, radar is likely soon to convince airline customers that there is a marked difference in time and comfort between airborne radar surveyed routes and conventional "ground advised" routes through storm areas.

Compact Computers Aid Production

Recent developments in the fields of military and commercial electronic computers show the rapid progress toward linking the subminiature advantages of transistor with automatic production techniques.

• **A completely transitorized** and commercially available computer has been announced by International Business Machines Corp. A transistor-magnetic core combination forms the computing and memory elements.



PLUGGABLE printed wiring panel adapted to fast, automatic production techniques that have been set up by IBM.

The new IBM 608 machine has 700 pluggable printed wiring panels using 3000 transistors. The panels are designed for adaptation to production by fast automatic techniques already in use by IBM for airborne computers.

An "Autofab" unit developed by the Mechanical Division of General Mills Inc. was delivered to IBM (American Aviation, March 19, 1955) a short time ago, and the new computer's "building-block" panels probably will be among the first applications of the "Autofab" machine to the manufacturing of commercial computers.

• **A miniature digital** computer developed by Bell Telephone Laboratories for the Air Force was probably the first all-transistor computer designed for airborne use. The BTL *Tradiac* (Transistor-Digital-Computer) occupies only three cubic feet; a notable reduction in space required for a computer that handles 60,000 additions or subtractions, or 3000 multiplications or divisions per second. *Tradiac* handles thirteen 16 digit numbers simultaneously. 800 transistors and 11,000 germanium diodes do the job formerly handled by 18,000 vacuum tubes, and only 100 watts of power is needed.

• **Another miniature computer,** claimed by Philco Corp. to be 10 times faster, with one-third the size, cost and weight of any previously announced computer uses Philco's new Transac, (Transistor Automatic Computer) arithmetic unit. Transac, contained in a 5½-inch cube and designed for mass production, may prove to be the "universal computer" heart of industrial machine controls, business data handling machines or military weapons system computers.

Using printed wiring panels bearing 1,242 surface barrier transistors and 322 resistors, a phenomenal speed of 600,000 additions or subtractions per second is possible. "Direct coupled transistor circuits," claimed to be of novel design, give the arithmetic unit an operational speed "adequate for all military operations in the foreseeable future."

Bell Improves Solar Battery

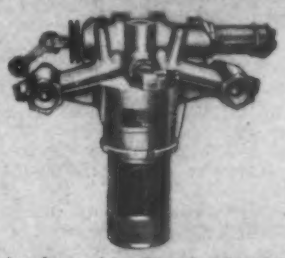
Further refinements in fabrication of the Bell Telephone-developed solar battery now give the sun-operated device an efficiency of 11% (comparable to the energy conversion efficiency of the best gasoline engines), according to the Bell Telephone Laboratories.

When first announced a year ago, 6% efficiency was obtained, but now the small silicon wafers that are the solar energy converters of energy can be linked together electrically to produce 100 watts per square yard of silicon surface.

Minute traces of boron introduced into the atomic structure of the silicon surface form a p-n junction similar to the junction phenomenon utilized by the original p-n junction germanium transistor.

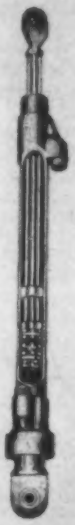
Already in experimental use for supplying power to communications systems requiring low power, the solar battery has been proposed for small earth satellites containing low-power telemetering equipment for transmitting to earth data on synoptic observations of the upper atmosphere.

Strut Assembly—
Main Landing Gear Retract



Valve Assembly—Steering Metering

Spoiler Valve



Pneumatic Door Lock

High Heat Treat
Strut Assembly

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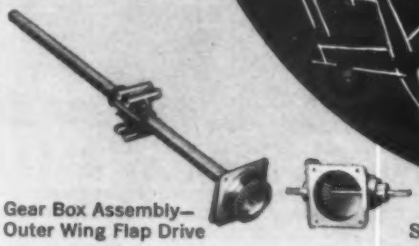
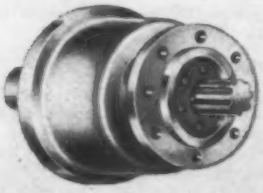


Gear Box Assembly—
Outer Wing Flap Drive

Gear Box



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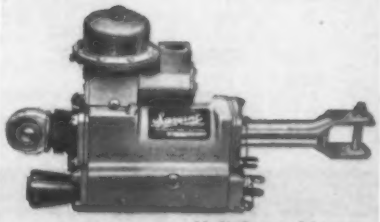

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Ford Instrument's standard lines

New Products and Processes

Goodrich Unveils New Tubeless Aircraft Tire

A new high-pressure tubeless aircraft tire that will withstand the shock of take offs and landings at 300 mph speeds has been introduced by The B. F. Goodrich Tire and Equipment Division.

According to company officials, it is the world's first tire capable of such performance. It recently passed tests believed to be the most rugged ever given a tire, they said. During dynamometer landing tests, the new tire was rammed against a test road wheel spinning at 300 mph and held against it long enough to simulate the complete landing run of an aircraft.

The new tire saves up to 40% of normal tube weight. As added benefits, elimination of the tube permits closer control of tire balance and dispenses with the threat of tube pinching. A special layer of American-made rubber inside the tire enables it to hold air much longer than conventional tubes, Goodrich says.

Circle No. 160 on Reader Service Card.

Pressure Switch

A pressure-actuated switch developed by Manning, Maxwell & Moore, Inc., Aircraft Products Division is designed to control aircraft electrical circuits whenever system pressure varies from a specified value.

The new switch weighs only nine ounces and performs within ±0.5 psi of a 5 psig setting, ±2 psi of a nominal 50 psig setting and ±3 psig of a 100 psig setting.

Rating is 30 volts, 2.5 amperes inductive load at 50,000 ft. It performs over a temperature range of —65° to +250°F, and operation remains within limits under vibration schedules for 0 to 2,000 cps and accelerations up to 20g.

Circle No. 161 on Reader Service Card.

Control Panel

Bendix Radio Communications Division, Bendix Aviation Corp. soon will market a new transistorized audio control panel for use in airline and executive aircraft communications installations. Sixteen of the new panels already have been ordered by KLM Royal Dutch Airlines.

Two models will be produced—CNA-2A for DC-6/DC-7 and Convair

pedestal mounting, and CNA-20 conforming to the 5.75" standard width adopted by Radio Technical Commission for Aeronautics. Transistors are two General Electric type 2N-45.

Engineering of the new panels emphasizes functional design with three different types of switches used to identify separate operations. Illuminated push-buttons are used for transmitting, a rotary switch for filter selection, and toggle switches for receiving

Circle No. 163 on Reader Service Card.

Test Unit

Commercial availability of a new 17-pound portable test unit for maintaining capacitor type fuel quantity gauging systems has been announced by The Liquidometer Corp. It is currently being supplied as the USAF type MD-2 tester and commercial model is EA-810.

The Liquidometer unit tests capacitances up to 5,000 micromicrofarads with only 25 volts a-c applied to components. Insulation resistances up to 10,000 ohms can be checked by applying only 50 volts d-c. Literature available.

Circle No. 166 on Reader Service Card.

Hydraulic Pumps

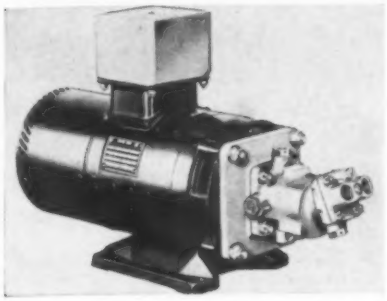
Availability of a new electric motor-driven hydraulic pump for use as either a primary or auxiliary power source in aircraft hydraulic systems has been announced by Vickers, Inc.

The combination can consist of a fixed displacement or automatic pressure-compensated variable displacement pump with either explosion-proof or explosion-resistant motor. According to Vickers, extremely high pump efficiency (92% overall) reduces electric power requirements and proportionally extends availability for emergency operation.

Model pictured here is Vickers AA-19033 designed for continuous duty.

Circle No. 24 on Reader Service Card.

The pump is driven directly at 7500 rpm and has an output of 2.5 gallons per minute. Pump weight is 2.18 and



combined weight with 4¾ hp explosion-proof motor is 33.9 pounds.

Circle No. 168 on Reader Service Card.

Test Stand

Greer Hydraulics, Inc. has unveiled its new Model KG-100 multi-purpose test stand for checking performance and operation of aircraft hydraulic system components. Provisions are included for testing such items as relief valves, actuating cylinders, brake valves and hand pumps.

Powered by a 75 hp electric motor that drives two 20 gpm capacity pumps, the new Greer stand will deliver hydraulic fluid at flows up to 40 gpm and pressures up to 5,000 psi. A 20,000 psi handpump circuit is included for static and proof pressure tests.

Circle No. 162 on Reader Service Card.

Pulse Network

New hermetically-sealed, high-power pulse forming network produced by Luther Electronic Co. supplies power through a pulse transformer to magnetron and Klystron generators for radar, aircraft and missile applications.

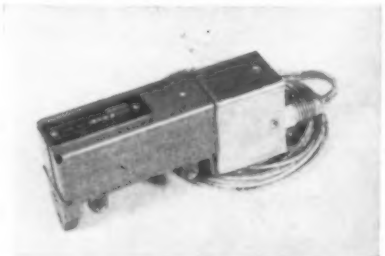
It provides pulses of specific duration, voltage, amplitude and impedance in systems of 5-100 kv, 2 ohms or more impedance, and pulse width from 0.1 microseconds.

Circle No. 164 on Reader Service Card.

Fuel Valve

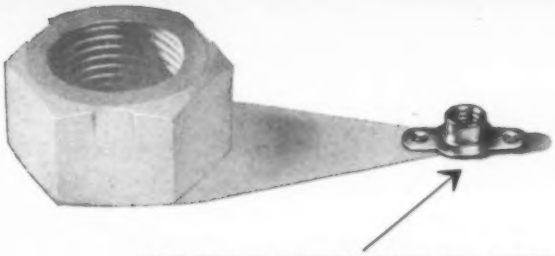
Aero Supply Co. has announced development of a new aircraft fuel tank anti-splash valve that prevents fuel loss through tank vent pipes by means of a float that controls two double-acting poppets.

The Aero Model 22-1349 unit, now in use on the Avro Canada's CF-100



all-weather interceptor, is said to cut vent system weight, simplify design, and reduce fire hazard.

Two governors control float opera-



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A new, light weight series of Boots **PLATE-LOK** . . . miniature, self-locking anchor nuts (fixed or floating) designed to meet MIL-N-25027 specifications. **PLATE-LOK** fasteners are a proven development by Boots, pioneers in minature plate nuts since 1942.

PLATE-LOK'S *triangular* locking design provides consistent centering of screw or bolt, its *spring steel* construction assures highest tensile strength and lightest weight plus *infinite reuseability*.

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tion. One is sensitive mainly to centrifugal accelerations acting around the longitudinal center-line of the aircraft. The other senses negative gravity accelerations. Combined, the two governors entirely eliminate siphoning of fuel through vents.

Circle No. 165 on Reader Service Card.

G-Accelerator

New model E-185 G-accelerator developed by Genisco, Inc. for testing complete electronic or mechanical packages will handle two test objects up to 30-inch cube in size and 300 pounds in weight simultaneously. The company has recently completed an installation of the E-185 for the U. S. Air Force at Edwards AFB.

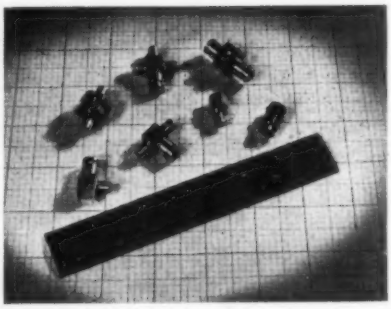
Outstanding feature of the new centrifuge is automatic dynamic balancing of the boom assembly, a factor that eliminates computation of the cg of test objects and speeds up test runs. Boom speeds can be read in 5 rpm increments and time required for acceleration from 0 to 60g is about 45 seconds. Specifications available.

Circle No. 167 on Reader Service Card.

New Connectors

Lightweight subminiature connectors designed by Avien, Inc. for use in its fuel quantity gauging and fuel management systems are said to be about one-third the size and one-quarter the weight of comparable types.

The new units are impervious to



moisture, according to Avien, and will maintain a minimum shell-to-conductor resistance of 100 megohms even after prolonged immersion in salt water.

Available connectors include plugs, jacks, crosses, tees, right angles and pressurized bulkhead feed-through types.

Circle No. 170 on Reader Service Card.

Automatic Cleaner

Magnus Chemical Co., Inc. has added two automatic features to speed and simplify the handling of parts in its new "Aja Lif Automatic" cleaning equipment.

In an automatically-timed and operated cycle, a "nu-matic push device" and "air lift loading" feature combine to move the work from floor level into the cleaner and return it to floor level when cleaning is completed.

The process can be designed for any number of operations and for use with solvents, alkalies or acids. No special foundation is required for installation in an existing production line.

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★**L. G. Fritz,** American Airlines. Vice president-flight operations, New York.

★**Buell E. Warner,** General Electric Co. Flight engineer, Schenectady.

A. C. Kennedy, L. B. Smith Aircraft Corp. Materials mgr., Miami.

George Bowyer, Pratt & Whitney. Machinist, East Hartford.

William E. Dalzell, Pratt & Whitney. Lathe operator, East Hartford.

C. L. Ehlers, Allison Div. General Motors Corp. In sales, orders and parts, Indianapolis.

H. M. Favor, Allison Div. General Motors Corp. In engineering standards, Indianapolis.

M. R. Hensley, Allison Div. General Motors Corp. Foreman-aircraft assembly, Indianapolis.

H. D. Huff, Allison Div. General Motors Corp. Blades inspector, Indianapolis.

J. C. Phillips, Allison Div. General Motors Corp. Blades shopman, Indianapolis.

G. E. Mears, American Airlines. Director-communications, La Guardia.

L. H. Mead, American Airlines. Foreman-ramp equipment, La Guardia.

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International Aviation

By Anthony Vandyk

LOOKING through the biographies of the top men in the European air transport industry, it is revealing to note how few had airline backgrounds before assuming their present positions.

Louis Lesieux, Air France's new president, is no exception. Aged 48, he is a civil engineer by profession. It was only in 1944 that he came on to the aviation scene—and then only in a minor way in connection with the development of Nice airport. He then remained in the airport field becoming president of the Paris Airport Authority in 1948.

With an 11-year aviation background, even though not in an airline, Lesieux enters his new job with a good basic knowledge of the industry's problems. Another recently appointed airline president, Henning Throne-Holst, took up his position seemingly less well equipped. A prominent Swedish industrialist, he served a few months on the board of Scandinavian Airlines System before being named president of the company.

There is no reason why Lesieux and Throne-Holst should not make successes out of their jobs for several currently successful European airline presidents entered their companies "cold." Sabena's Willem Deswarte, for instance, was perhaps best known as the pre-war head of a large Brussels department store. Swissair's Walter Berchtold was a regional manager of the Swiss Federal Railway before joining the airline. Sir Miles Thomas, chairman of BOAC, was the head of a big automobile manufacturing concern almost all his working life. Although, like British European Airways chairman Lord Douglas, he was a World War I pilot.

Lord Douglas and KLM president I. A. Aler have had somewhat similar careers in that both occupied high positions in airlines and in military aviation. Lord Douglas was chief pilot of the Handley Page Transport Company in 1919 and 1920 and later held numerous top appointments in the Royal Air Force. Aler was with KLM for 13 years before World War II, rising to the position of chief of the flight division. He rejoined the air force in 1940 and rose to be its commanding general. It takes all kinds to make airline presidents.

BEA Starts Helicopter Service to Central London

British European Airways is opening its scheduled helicopter service between central London and London Airport this month. Two Westland-Sikorsky S-55s will be used on this run and they have been specially equipped with twin-float gear mounted above the normal wheel undercarriage to make possible emergency landings on the River Thames in the case of engine failure. They also have a developed engine silencer.

The flotation gear, including a 20-pound anchor and cable, weighs 40 pounds while the silencer weighs 96 pounds. This weight reduces speed by 10 mph and cuts the S-55's normal passenger load to four persons. BEA is charging $4.90 for the 17-mile 20-minute flight from London Airport to the central London terminal near Waterloo. The cost of operating the S-55 on this service is estimated by BEA at $4.45 per mile, so the operation will end up in a deficit.

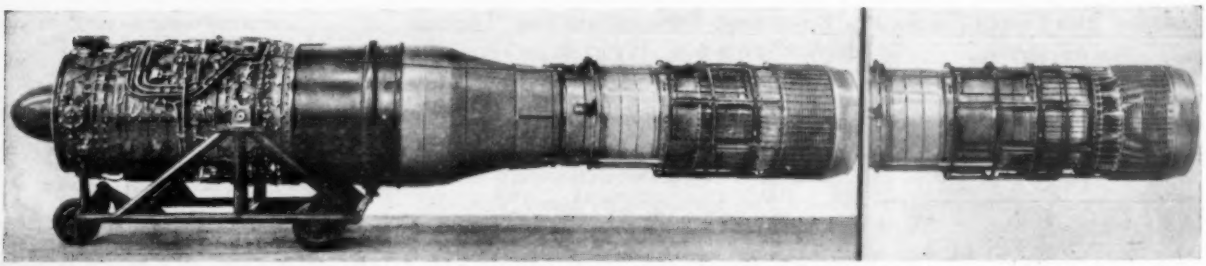
Transport Briefs

Trans-Canada Air Lines has ordered three more Viscounts, bringing its total order to 25 aircraft (six of which have been delivered); it has also ordered an additional Lockheed Super Constellation . . . **Aerovias Panama** has opened a thrice-weekly Panama-Miami service (one flight also calls at Kingston, Jamaica) using DC-6 equipment of Trans-Caribbean Airways; fares are substantially below the IATA level . . . **Orient Airways** has been merged with **Pakistan International Airlines** giving PIA a fleet of three Super Constellations, two Convair 240s and 11 DC-3s . . . Merger of **Aigle Azur** into **UAT-Aeromaritime** is to take place as a result of the purchase by French shipping company Chargeurs Reunis of an interest in the former; it has controlled the latter for many years . . . **Varig** now plans to open its service to New York in September; the Brazilian airline initially will operate a twice-weekly 59-seat Super Constellation service over the route Buenos Aires-Montevideo-Sao Paulo-Rio de Janeiro-Belem-Ciudad Trujillo-New York.

Uruguay's **PLUNA** is planning to purchase two Convair 340s . . . **Philippine Air Lines** has taken delivery of three de Havilland-Canada Otters . . . Poland's **LOT** has become the first foreign airline to service the Soviet Union since the war; it has opened a thrice-weekly Warsaw-Moscow service with I1-12 equipment . . . **Sabena** Belgian World Airlines has inaugurated helicopter service to Eindhoven, Duisburg and Dortmund. Canada's **Associated Airways** has bought three four-engine Avro Yorks for use on the DEW (Distant Early Warning) airlift . . . **British European Airways** is to lease the two Viscounts ordered by Norwegian independent **Fred Olsen Air Transport.**

Manufacturing Briefs

A Dart is to be substituted for the Mamba in the Breguet 965 anti-submarine aircraft . . . Spain's **CASA** 207 Azor twin-engine transport is due to fly this month . . . Latest flight date for the **Vickers** 1000 jet transport is "mid-1956," according to a British government spokesman; it is rumored that Bristol Olympus engines may be used instead of Rolls-Royce Conways . . . **Bristol** plans to bring one of its Model 171 Sycamore helicopters to Canada very shortly as an initial move in an attempt to enter the Canadian helicopter market . . . Three German companies are negotiating for foreign licenses: **Henschel** wants to build Sikorsky helicopters; **Daimler-Benz** is interested in the Rolls-Royce Dart and **BMW** has been talking to Turbomeca about building the French company's turbines.



FRANCE'S SNECMA has now equipped an Atar with its reverse thrust device. The deviator is retracted for normal flight and extended (right) when thrust reversal is required.

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West Coast Talk . . . By Fred S. Hunter

- **Lockheed An A-powered bomber?**
- **How to parlay a master's degree**
- **$100,000 tax for phone calls**

BIG question mark in Burbank these days. What's going on in the back room at Lockheed? Meaning in experimental at B-1. Lockheed's had secrets before. But this one is so secret even company employes are expressing curiosity. The grapevine says the project is very, very hot. Lockheed has been moving more of its better people over to it. Progress on a nuclear job, maybe?

* *

Do you suppose we might have a nuclear bomber to succeed Boeing's eight-jet B-52 in 1965? Since the B-52 is just now coming up toward the operational stage, it might seem premature to be bringing up the question of a successor already. But not to Gen. Curtis LeMay and his staff at the Strategic Air Command. They have to keep thinking 10 years ahead on equipment.

Take the B-52 itself. Boeing Airplane Co. went to work on the XB-52 in 1947.

The aircraft has two more years to be entitled to a 10-year pin, and it will take just about that long to finish up on Phase VI tests and all the various other details to fit the huge bomber into SAC's operational pattern.

Of course, alterations can be made along the line. Boeing actually won the B-52 design competition with a turboprop proposal. The Air Force later changed its mind and ordered the switch to P&W's J57s. But the fact remains that the decision on the equipment SAC uses in 1965, whether its a new nuclear bomber, an intercontinental missile or the B-52 carrying over, is being made right now.

That, it might be added, calls for big-league crystal-gazing.

* *

Walter Platt, who is now deputy administrator for Joe Marriott in the CAA 4th Region in Los Angeles, was one of the initial group of 16 personnel assigned in 1939 to launch the federal airways program in Alaska.

He stayed 16 years; even became a homesteader.

American Airlines and Western Air Lines picked street locations facing famed Wilshire Blvd. for their ticket offices in the new Beverly Hilton Hotel now nearing completion in Beverly Hills. TWA and United Air Lines picked off-street locations nearer to the hotel lobby and the parking lot. Each duo thinks it outsmarted the other.

* *

This, we are told, is a true story. Bright young engineer with a new master's degree went job shopping. A major airframe manufacturer offered $600 a month. The next offer, from an electronics company was for $640. Another airframe offered $650. A not-so-big accessory concern boosted the ante to $700.

He wound up with a recently organized electronics outfit at $750, and thus raised his pay by $150 a month in three days.

* *

Garrett Corp., counting up its taxes, found it had paid $100,000 in taxes on its fiscal 1954 telephone bill . . . The CAA 4th Region also did a little counting recently on the growth of the airlines and found that air carriers having their main operations or maintenance headquarters in the region have 400 aircraft, 2,500 pilots, 611 maintenance personnel, 400 flight engineers and 150 dispatchers.

* *

Miramar Hotel in Santa Monica will be able to accommodate 600 Douglas stockholders in enlarged facilities at the annual meeting next year, as compared to 250 this year. Douglas will undoubtedly need the room.

The stockholders just love Douglas these days.

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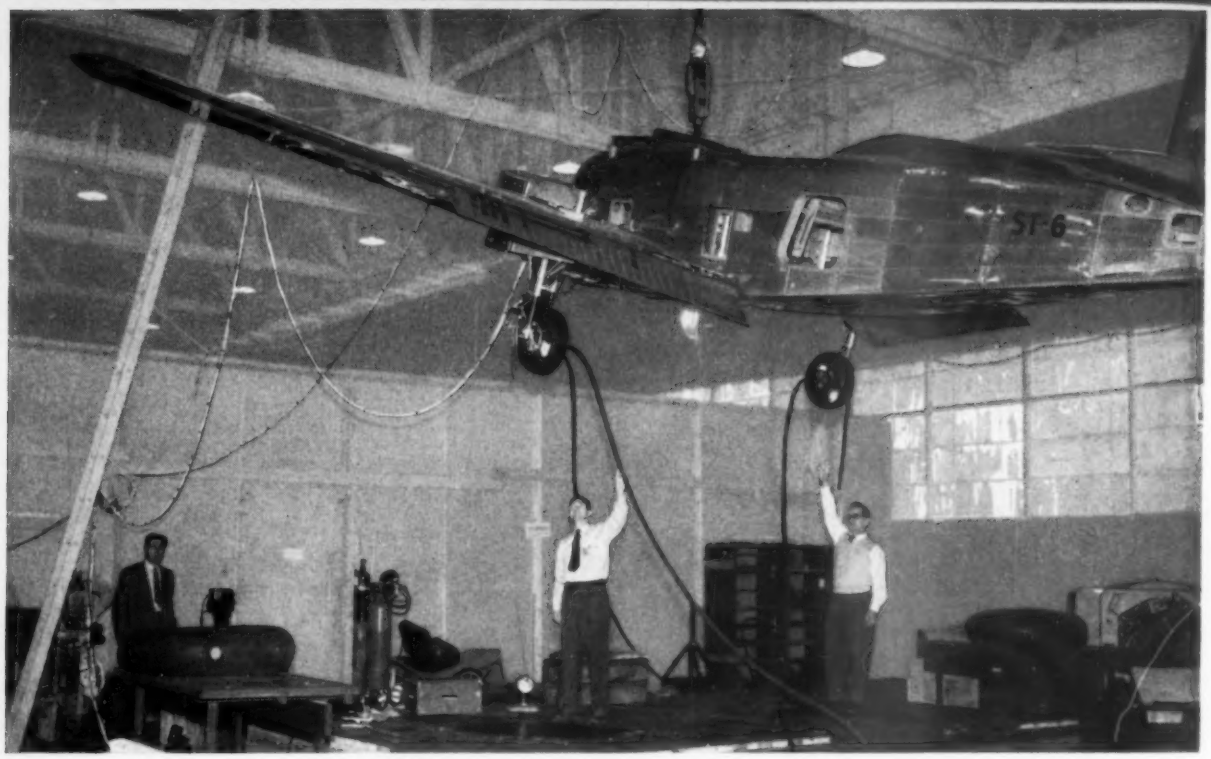

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Progressively more severe drops were made until the Navy requirement was met, and passed. Higher drops of the airplane continued without significant damage. The above photograph shows *the 186th drop test* which successfully imposed loads *74% greater* than the Navy specification, *and without significant failure*. This is another demonstration of the *"Plus Factor"* possessed by Beechcrafts and rendered to their owners, as better service and decreased cost of upkeep.

The Beechcraft T-34 is now in production for the U. S. Navy, U. S. Air Force, and the military services of Canada, Chile, Colombia, El Salvador, Japan.

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TRANSPORT TRENDS Washington, D. C., May 9, 1955

EFFORTS OF WALL STREET INTERESTS to gain a foothold in Western Air Lines' management were successful late last month with the election of J. M. Templeton, New York investment counselor, to WAL's board of directors. Templeton unseated Western's v. p.-service M. W. Landes who was immediately reinstated by a director vote enlarging the board from 13 to 14 members.

Interests represented by Templeton include those of W. H. Salvatore who has large stock holdings in Northwest Airlines and reportedly played a major role in NWA's refusal to merge with Capital Airlines several years ago. He also was a prominent figure in reports last year that Wall Street interests were active in Northwest's management decisions.

DELIVERY LATE THIS MONTH of the first Douglas DC-7B to Pan American World Airways promises to touch off a new era in international airline speed competition second only to the transcontinental non-stop race it started in the U. S. last year.

Development and production of the "B" series DC-7 sets something of a record at Douglas. First production airplane was flown late last month less than two years after the roll-out of the first (American Airlines) DC-7 on May 18, 1953.

SHARP DISAGREEMENT CONTINUES TO PREVAIL among airlines over handling of the no-show penalty problem. Due for debate by Air Traffic Conference at press time were two proposals: one that present penalty on coach no-shows be dropped, and another that the coach arrangement be extended to first-class services.

Leaders of the divided camps are Trans World Airlines and American. TWA wants coach penalty dropped because it is virtually impossible to administer. AA stand is that carriers must face up to the no-show problem now and devise a workable system to combat it.

CAB LAST WEEK DISMISSED the Eastern Air Lines-Colonial Airlines control case instituted last year following President's disapproval of a Colonial-EAL merger. Board plan now is to set an early pre-hearing conference date on the revised merger agreement field by the carriers in January. It calls for acquisition of CAI by Eastern, with EAL trading one share of stock for each two shares of Colonial.

AIRLINE ORDERS FOR DOUGLAS DC-7C series aircraft continue unabated with the total now approaching the 100-mark. Most recent activity is Pan American World Airway's increase of its order to 33 which, along with seven DC-7Bs and spares is valued at $110-million.

Orders and reorders have come so fast that Douglas is moving into the 4th quarter of 1957 on delivery positions for DC-6Bs and DC-7s. Western Airline's order for seven DC-6Bs closed out the 2nd quarter position at Santa Monica and orders by United, Northeast, Northwest and Continental almost fill out all 3rd quarter locations.

PROMISE OF A SIGNIFICANT COURT FIGHT over CAB authority to exempt non-mail carriers to carry mail looms over recent 4-to-1 vote permitting Slick Airways, The Flying Tiger Line and Riddle Airlines to participate in 3¢-mail-by-air experiment.

Board has ordered voluntary stay of its decision until May 13 pending oral argument on a permanent stay before U. S. Court of Appeals on May 12. CAB deferral came after notice by American Airlines of pending court action questioning the legality of the exemption.

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Transport Aviation

Balboa Decision Weds 'Big' and 'Small' Airlines in Interchange Arrangements

By WILLIAM V. HENZEY

IN ORDERING the "big" to interchange with the "small" in its New York-Balboa decision late last month, the Civil Aeronautics Board concluded that the Pan American World Airways system in Latin America needed more effective competition.

At the same time, the Board hit at the "competitive disparity" between Eastern Air Lines and National Airlines in the New York-Miami market with figures showing EAL's domestic system is "approximately four times the size of National's."

CAB's plan, backed by President Eisenhower, is for the "small" domestic carrier, National, to join with the "big" Latin American carrier, Pan American (including Panagra), and for the "small" Latin American carrier, Braniff, to join with Eastern, each for the performance of through interchange service between New York and Latin America.

• **In giving the parties 60 days** (from April 18) to work out interchange agreements, CAB refused emphatically to approve the pending agreement under which Eastern, Pan American, and Panagra, would have operated a joint service.

"Pan American's domination of air passenger traffic to and from South America," CAB said, "has been steadily increasing." Between 1951 and 1953, it had jumped 53.2%. Over the same period, traffic of other U.S. flag lines in the area increased only 44.3%, while foreign flag line traffic was up 50.2%.

"The continued dominance by Pan American," CAB added, "is particularly pertinent when viewed in conjunction with the size of PAA's South American system. That system—including both Panagra and the Latin American Division of PAA—generated 33% more traffic in 1953 than the next largest U.S. flag international operation."

• **On a revenue ton-mile basis,** the Board indicated PAA's South American system exceeded PAA's Pacific operation by 104%, TWA's total international operation by 82.5%, and PAA's Atlantic service by 33.2%.

Said CAB: "Linking by interchange a system of this size to Eastern Air Lines—our largest north-south carrier in the eastern U.S.—would obviously be inimical to the attainment of effective competition between air carriers serving South America."

As for the "competitive disparity" in the U.S. between Eastern and National, CAB advanced these statistics for the year ended March 31, 1954:

	National	Eastern
Revenue ton-miles	69,180,000	266,113,000
Total Revenues	$33,052,000	$138,178,000

In the New York-Miami market which is primarily involved in the Balboa Case, CAB indicated Eastern's participation in traffic has jumped from 46% in March 1952 to 59% in the first quarter of 1953.

The proceeding, one of the stormiest in CAB's history, centers around what the Board considers "the largest foreign air transportation market to which American flag carriers have access. Moreover, it is a market which has expanded tremendously in the past, and which may be expected to continue to grow in the immediate as well as more distant future."

• **Illustrating growth** of the market, CAB noted that in 1931 total Latin American passengers were 395,258 of which 15,621 were air passengers, whereas 20 years later the total market grew to 1.1 million passengers, of which 928,000 traveled by air.

In setting the future competitive pattern to handle this growing market, CAB apparently has brought to a conclusion a four-year battle which three times embroiled Presidents of the United States. CAB's decision to link the small with the big has been maintained ever since the first recommendation went to the White House in the summer of 1952. Former President Truman shied

BRISTOL BRITANNIA lands at Jan Smuts Airfield, Johannesburg, South Africa, during recent tropical tests. Powerplants on this Model 100 version are Proteus turboprops rated at 3,780 eshp each. Later versions will get more powerful Proteus engines.

away from settling the matter and, the day before President Eisenhower took office, sent the case back to CAB for resubmission to the new President.

CAB immediately resubmitted it and, several months later, Eisenhower returned it to CAB for further hearings to freshen up the record. Finally, last November, the case went back to the White House setting the stage for last month's action.

• **Significantly,** although the President approved only the phase of the case dealing with certification of Braniff between Miami and Havana, he endorsed by that action the pleas of National and Braniff, made almost two years ago, that the interchanges involved were within CAB's jurisdiction and not needing affirmative action of the President.

Previous impression had been that all phases of the case would require presidential sanction.

In calling for new agreements linking Braniff with Eastern, and National with Pan Am and Panagra, CAB did not "compel" the carriers to get together, in language to that specific effect. But the Board held several aces which meant it expected compliance with its findings.

First, it withheld approval of an extension of the so-called Through Flight Agreement which is the trackage arrangement by which Panagra gains its only access to the U. S. mainland, utilizing PAA's route from Balboa to Miami.

• **Strong implication** was that unless PAA, Panagra and NAL get together, the Through Flight Agreement would get no further extension.

As for Eastern and Braniff, CAB held in abeyance a ruling on an issue in the case dealing with a compulsory interchange order. This was seen as indicating that if those carriers fail to get together in the 60-day period, the Board would then issue a compulsory order.

At press time, both National and Braniff had expressed a willingness to negotiate with the partners selected by the Board. In fact, Braniff's president Charles E. Beard wired EAL that Braniff was ready to talk. Absence of EAL's board chairman from the country until May 8, however, seemed to preclude any meetings at least before that date.

NAL's president G. T. Baker issued a formal statement in which he said his company was ready to negotiate immediately with PAA and Panagra.

Pan Am and Eastern had indicated during the course of hearings they might go to Court with any adverse decision, but as this issue went to press had issued no statements of reaction to the decision.

• **The CAB action** represented the views of then-Chairman Chan Gurney and Members Josh Lee and Joseph P. Adams. Opinions containing both concurring and dissenting views were issued by former Board Member Oswald Ryan and present Member Harmar D. Denny.

Ryan felt the Board should have withheld ruling on the Eastern-Pan Am agreement until after final disposition of the Justice Department's antitrust suit pending against Pan Am, Panagra, and W. R. Grace & Co.

Ryan said the basic problem is the existence of uneconomic competition in South American service, and that the Board decision compounds that problem by providing two competitive through services for a "thin stream of traffic."

Denny agreed with the majority on most phases of the case, but dissented with respect to disapproval of an Eastern-Pan Am interchange to and from Nassau and various Caribbean points.

• • •

CAB Runs Out of Subsidy Money

Civil Aeronautics Board will not have enough money to pay airline subsidies for the full 1955 fiscal year in a situation so confusing it would be funny were it not for the potentially disastrous effect it may have.

The problem developed late last month when Congress appropriated only $8.9 million to cover subsidies through June 30, whereas CAB had requested a "bare minimum" of $15.2 million. Involved was a supplemental request made necessary last year when Congress appropriated just enough to meet subsidy payments through March, 1955.

Through international developments where subsidy demands lessened, CAB was able to stretch the original appropriation through April. It needs $15.2 million, according to Board Secretary M. C. Mulligan, to meet May and June payments.

• **More confusing,** however, is which carriers will get the additional money and which will be necessarily cut off. The House, which originally was all for cutting CAB's $15.2-million request to $5 million, agreed to a compromise figure of $8.9 million, but earmarked the money for local service airlines.

Debate on the Senate floor, however, appeared to earmark the money for "U.S. domestic carriers" which, in addition, to local service lines would include Braniff, Colonial, Continental and Northeast. But either of these plans would exclude all the Alaskan carriers, the two Hawaiian carriers, and all of the U.S. international lines that still require subsidy. It was not clear whether the three helicopter operators would come under the term "U.S. domestic carriers" or not.

• **If only the local lines** are to be paid, then there would be an immediate termination of subsidy for all other lines since CAB only had $1.5 million cash on hand the last week of April and more than half of that came when Trans World Airlines refunded $719,000. That is considered less than enough for one week's subsidy payments.

At presstime, CAB was preparing to seek clarification from both the House and Senate Appropriation Committees. Gist of the Board's request was to be, "Just which carriers are to get the reduced amount of money made available?"

No matter which way the question is answered, some, if not all, carriers will come out short. In some areas, such as Alaska and Hawaii, small lines may even be forced to suspend operations entirely. Some of the large international lines may have to drop loss services and move equipment into their more lucrative operations thus resulting in a diminution of service to the public.

CAB, by law, determines how much subsidies are to be paid and, presumably, airlines can rely on receiving such amounts. But Congress holds the purse strings and, even though the carriers may legally be entitled to the full amounts, legal recourse would be a long and involved matter during which many carriers could fall by the wayside.

DC-6B INSIGNIA is mounted on the door of Australian National Airways new Douglas transport so passengers can determine readily the type of plane they are boarding. This is the insignia on the Kwinana, second DC-6B recently delivered to the Australian Airline at Melbourne.

Board Sets Standard For Pacific Mail Pay

The Civil Aeronautics Board has ordered a standard mileage of 5,078 miles to be used in the computation of trans-Pacific mail pay for Northwest Airlines and Pan American World Airways. The action is retroactive to April 1, and was put into effect on a temporary basis because Pan Am filed objections.

The mileage is that of Northwest between Seattle and Tokyo using the so-called "Great Circle" route. Pan Am's actual mileage through Hawaii is 1,610 miles longer. Although both carriers are paid 50¢ per ton-mile for the carriage of U.S. mail, total charges were less, before standardization, on Northwest because of the shorter mileage.

The fact that Northwest, because of the mileage advantage, was getting an increasing volume of the mail, led CAB to recognize the same mileage for both carriers to achieve a more even distribution. CAB indicated NWA's volume had grown so great as to remove that carrier entirely from the subsidy category for the past few months. But PAA's shrinking participation was pointing to increased subsidy needs for that carrier and eventually higher total charges for the Government.

Pacific mail revenue became a significant factor early this year when the Defense Department agreed to ship military mail via commercial airlines instead of on military planes.

At that time, however, estimates indicated that of 32 million ton-miles of mail per year in the Pacific, Pan Am would carry 26 million and NWA only 6 million. Since then NWA's equipment situation has improved and the Government, because of lower total charges, shipped more and more via NWA.

The new CAB mileage plan is aimed at reaching a happy medium as to distribution between the two lines. Newest estimates indicate there will be about a 50-50 split of the market under the mileage equalization plan. If it works out, both carriers may be able to operate without subsidy.

Stockholders Approve Sale of Colonial to EAL

Stockholders of Colonial Airlines and Eastern Air Lines voted overwhelmingly in favor of the agreement, now pending CAB approval, in which Colonial will sell its assets to Eastern.

Colonial shareholders voted 344,303 in favor of the deal, 5,470 opposed, and 165,827 shares were not voted. A minimum of 257,801 shares were needed under Delaware corporate law for approval.

Eastern voted 1,764,275 shares in favor and 6,803 against.

The agreement, involving an exchange of one share of Eastern for each two shares of Colonial, was filed for Board approval last January but has not advanced on the procedural calendar pending CAB decisions on the controversial "control" issue which last year resulted in disapproval by the President of a previous Colonial-Eastern agreement.

CAB Calendar

May 10—Hearing, Lynchburg-Washington Route Case (Piedmont Aviation). Wash., D. C. Docket 6935.

May 11—Oral argument, North American Enforcement Case. Wash., D. C. Docket 6000.

May 18—Oral argument, Kalispell, Mont. Elimination Case (Northwest Airlines). Wash., D. C. Docket 4775.

May 25—Oral argument, Trans-Texas Airways Renewal Case. Wash., D. C. Docket 6485.

June 1—Hearing, Helicopter Air Service Renewal Case. Wash., D. C. Docket 6600 et al.

June 1—Oral argument, Air Taxi Operators Classification. Wash., D. C. Draft Release—71.

June 14—Hearing, Surface-Mail-By-Air Rate Investigation. Tentative. Dockets 6881 & 6901.

Recent CAB Decisions

National Airlines granted one-year exemption to conduct scheduled non-subsidized helicopter services within a 100-mile radius of Patrick Henry Airport, Newport News, Va.

Allegheny Airlines and **Southwest Airways** joint purchase of Martin 2-0-2 aircraft from bankrupt California Central Airlines approved.

Western Air Lines' back mail pay (1944-48) reduced by $467,482 as CAB, applying Supreme Court "offset" decision, deducted profits from sale of intangibles involved in WAL's Route 68 sale to United Air Lines.

Examiner's Reports

Pan American World Airways recommended for permanency on Los Angeles-Guatemala City route with San Francisco added as U. S. co-terminal for five years. Examiner Francis W. Brown.

CAB Applications

Southwest Airways applied for certificate authority to operate between Los Angeles/Long Beach and Avalon, Santa Catalina Island, Calif.

Riddle Airlines has asked CAB approval, if necessary, of its plan to purchase five C-46 aircraft from Resort Airlines for July delivery.

Pending Cases

Reports indicate CAB's decision in the **States-Alaska Case**, transmitted to the White House on April 8, passed internally from the Budget Bureau to the President the last week of April. The decision involves a seven-year renewal for Northwest, three-year renewals for Alaska and Pacific Northern, and continuation of Pan American's present routes. Presidential signing is expected momentarily.

Still pending at the White House since last May is the Board's 3-2 vote in the **Trans-Atlantic Cargo Case** recommending an all-cargo certificate in the Atlantic for Seaboard & Western.

Next case requiring Presidential approval will be CAB's decision on **Trans-Pacific Airlines** application for renewal of its Hawaiian routes.

FIRST of the passenger-handling buildings being constructed at the new London Airport Central Terminal Area went into operation this month. It is occupied by British European Airways and 10 other continental airlines who account for 75% of the traffic at the airport. The new control tower is shown in background at right.

CAL's Goal: Subsidy-Free Operation by '57

BY ERIC BRAMLEY

Denver—The purchase of Pioneer Air Lines by Continental Air Lines, which was completed April 1, is expected to result in subsidy-free operations over the routes of the combined company by the second half of 1957.

And this will be accomplished without any realignment of routes, Robert F. Six, president of the enlarged Continental Air Lines, told AMERICAN AVIATION. "When we asked the Civil Aeronautics Board to approve our purchase of Pioneer, we said we wouldn't ask for any realignment, and we won't," he said.

Robert F. Six

When the CAB, by a 3-2 vote, approved this first acquisition of a local service line by a trunk carrier, it stated that the minimum subsidy saving to the government would be $221,000 a year. CAL claims it will exceed this. It has requested $2,112,476 in mail pay and subsidy for the year ending March 31, 1956. CAL and PAL together received $579,947 mail pay and $1,725,937 subsidy in 1954, or a total of $2,305,884.

The difference between this figure and the total 1954 compensation of the two companies is $193,408. However, CAL's breakdown of the requested $2,112,476 shows that $638,992 is mail pay and $1,473,484 subsidy. In other words, the combined systems will be earning $59,045 more in mail pay, while subsidy will be reduced $252,453.

Size of the combined company is illustrated by these statistics:

• **It serves 50 cities** through 46 stops in six states—Colorado, Kansas, Missouri, New Mexico, Oklahoma and Texas. In Texas alone, 23 communities receive service.

• **Before long,** it will employ 1,385 people, which is more than the two companies employed before the sale (CAL had 916, PAL 403). Payroll will be more than $7 million annually, compared with CAL's $4,475,000 last year.

• **It is flying** about 36,000 miles daily. Route miles total 4,797.

• **The aircraft fleet** includes 19 DC-3s, six Convair 340s, four DC-6Bs and one DC-6. Ten of the DC-3s were operated by PAL and are now leased by CAL. Three DC-6Bs are owned, a DC-6B is leased from United and a DC-6 from American.

• It has just announced a new $10 million equipment program, comprising orders for five DC-6Bs and three Convair 340s.

Last year, the passenger revenue of CAL and PAL was $13,081,000. In the year from April 1, CAL is aiming for $14,510,000, or an 11% gain. More than 662,000 passengers are expected to be carried. The company will spend close to $500,000 in advertising, about 70% of which will be in newspapers and on radio.

The acquisition has eliminated duplicating service and has resulted in improved schedules on segments of both systems, company officials state. Formerly served by both lines were Houston, San Angelo, Midland-Odessa, Santa Fe and Albuquerque. Now being offered is new one-plane one-carrier service between El Paso and Austin, from Dallas/Ft. Worth to Roswell, Hobbs and Carlsbad, from Houston to Austin, Roswell and Albuquerque, and from San Antonio to Lubbock and Amarillo.

CAL officials believe that the acquisition was accomplished with less trouble than any other similar deal in the industry. Responsible for this was:

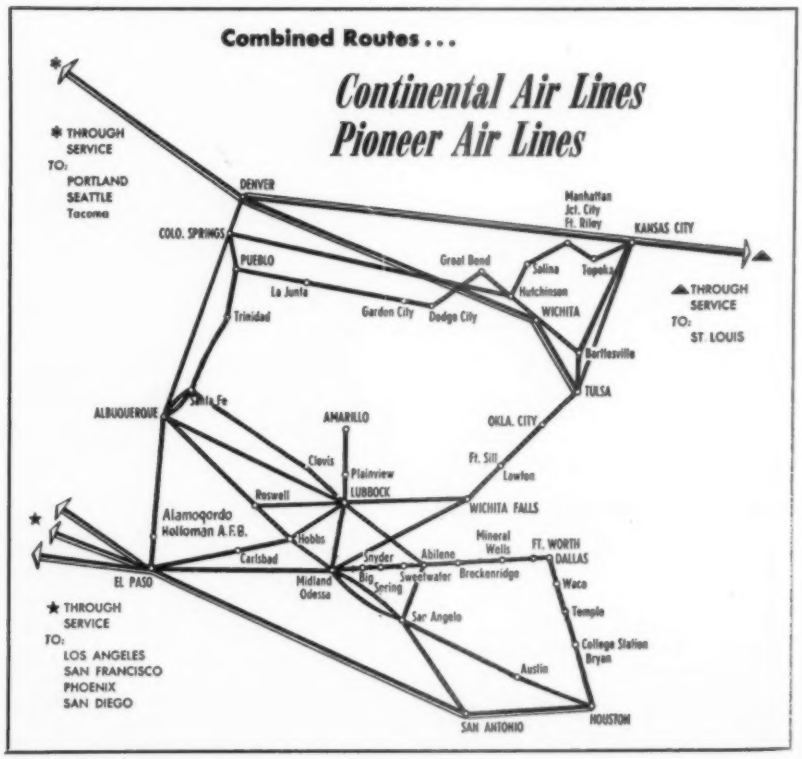
• **Cooperation** of Delta-C&S Air Lines and Braniff Airways. These companies were consulted frequently, and mistakes of the Delta-Chicago & Southern and the Braniff-Mid-Continent mergers were thus avoided.

• **Success of the pilots** in using Air Line Pilots Association machinery to work out their integrated seniority list. A pilots' negotiating team, consisting of G. W. Johnson and D. W. Ballard of CAL, and A. A. O'Neal and E. Walkowicz of PAL, settled the details. PAL's senior pilot is 37th on the combined list.

CAL now has 195 pilots and copilots (131 CAL, 64 PAL), 291 mechanics (204 and 87, respectively), and 14 dispatchers (nine and five). A new pilots' contract has been signed.

• **Each department** of CAL worked out in detail what had to be done to effect a smooth integration with the corresponding department of PAL. Timetables were established for each of the steps, and individuals were assigned definite responsibilities for seeing that these steps were accomplished.

Probably most important, however, was the fact that effort was made to keep employes of both companies informed of acquisition details as they developed. "Leaving people in doubt as



The ancient priests of Egypt were engineers whose great pyramid of Cheops was sextant, compass and slide rule—all in one. From sighting the Pole Star, to squaring the compass, to the mathematics of pi—it's all there in the pyramid of Gizeh.

flying pyramids

Wonder of the world for ages, Gizeh's pyramid was a fount of mathematical data—a tool to check measures, an aid to celestial navigation. Today's aircraft are "flying pyramids"—collecting and integrating instantaneous measurements for orientation and control. Kollsman activities cover these seven fields:

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Circle No. 32 on Reader Service Card.

to what's going to happen to them is the worst mistake you can make in a transaction of this kind," says Clarence West, executive vice president.

Each employe was told, as quickly as possible, where he would be located and what his job and salary would be. CAL officers and department heads visited Dallas and invited their PAL counterparts and wives to a get-acquainted dinner. A group of PAL employes and their wives were brought to Denver to survey housing, schools, etc. It was necessary to transfer only 28 people from Dallas to Denver.

• **CAL paid PAL** about $800,000 cash plus 65,000 shares of stock with net market value as of Dec. 10, 1953, of $6 a share (the stock now is worth approximately double that figure). Continental acquired PAL assets with net book value of about $1.3 million, including some $400,000 cash, and assumed $500,000 in liabilities.

Purchase of the 10 DC3s operated by PAL was not included in the deal. These airplanes were leased (with option to purchase) by PAL from Leair Inc. Pioneer Aeronautical Services, the "spin-off" corporation established by PAL to take over its Martin 2-0-2s, is purchasing Leair's stock, and Pioneer's DC-3 lease has been assigned to CAL.

All engine, airframe and accessory overhaul on Convairs and DC-3s is being performed at the Denver base. The Dallas base, taken over from PAL, will handle line service and checks on DC3s. Pioneer had formerly contracted its engine work to an outside firm. Overhaul and maintenance of CAL's DC-6Bs is performed by American and United.

SIGN OF INTERCHANGE—One of Continental's DC-6s carries markings of both CAL and United Air Lines.

By virtue of the PAL acquisition, Continental has been described as part local service carrier and part trunkline. Noteworthy also are its interchange services with American, United and Braniff, through which service is offered to the west coast, Pacific northwest and eastward to St. Louis.

• **Two of its DC-6Bs** and the leased DC-6 are used in the AA interchange from Houston and San Antonio through the junction point of El Paso and on to Los Angeles and San Francisco. Its other DC-6B and the leased DC-6B are used in the UAL interchange from Tulsa and Wichita through the Denver junction to Portland and Seattle. CAL Convairs fly a Denver-St. Louis interchange with Braniff through the Kansas City junction.

AA has integrated the CAL equipment into its own operations, which means that the planes may be used anywhere on the AA system and are not limited to the interchange. UAL also is in the process of integrating the CAL aircraft.

Through this method, Continental is benefiting from the size and scope of the operations of AA and UAL. It seldom sees its DC-6s, seldom knows where they are, and doesn't have to overhaul them. American and United pay CAL according to hours used. "As long as they fly plenty of hours and make money, we don't care where they are," says a Continental official.

The five DC-6Bs just ordered will be delivered starting in early 1957.

The combined company's management line-up includes:

• **Bob Six,** who has headed CAL since 1937, remains as president.

• **Clarence West,** with CAL since 1939 and vice president since 1946, is executive vice president.

• **O. R. "Ted" Haueter,** with CAL since 1938 and who had been vice president-operations, engineering and maintenance, is vice president-operations.

• **Charles H. Calhoun,** former vice president-engineering and maintenance for Mid-Continent Airlines and later National Airlines, has joined CAL in the same capacity.

• **Harold Seifert,** formerly PAL's vice president-operations, is vice president-operations and maintenance in charge of the Dallas base.

• **Harding L. Lawrence,** is vice president-traffic and sales, the same position he held with PAL.

• **Stanley Halberg,** formerly CAL's vice president-traffic and sales, has become vice president-advertising and public relations.

• **Lynn Dennis,** who was CAL's vice president-flight service, continues in that job.

• **Joseph A. Uhl,** CAL's vice president-treasurer, continues in that job.

Looking to the future, Bob Six hopes before long to be operating only two types of aircraft: a medium-range turboprop and the DC-6Bs. He believes that by 1958 a turboprop will be available that will meet the company's needs. Initially, CAL would need about 10 such planes. • • •

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Airline Commentary

By Eric Bramley

ON A RECENT TRIP to Denver we were intrigued by the new self-claiming baggage area at the airport. Originated by United Air Lines and first tried at Omaha, the system is now used by all airlines serving Denver. Passengers pick up their own luggage from the station claiming racks, instead of giving their checks to a porter. As they leave, a porter collects checks at the door. UAL is installing a similar set-up at Los Angeles to test it in a heavy traffic flow. Our observation was that the traffic through the Denver baggage room was smooth; no fuss, no muss. Provided bags are moved quickly from plane to room, this may be the answer to those perennial complaints about slow baggage service. Several other airlines are interested.

• •

C. R. Smith, president of American Airlines, has been an industry executive who has constantly emphasized the need for good passenger service. We particularly like his recent comparison of airlines and hotels "I am sure it would be possible to operate a good hotel in a tent, if the service was outstanding. When you seek out a hotel for your comfort and enjoyment, the first question you ask is not 'What kind of rooms have they?' but 'How good is the service?' . . . For my part, I will take the hotels which give 'Thank you, Mr. Smith' service, and you can have the glazed-eyed clerks and the efficient answering machines which too often go with the imposing towers."

• •

A word of praise for Capt. W. H. Pearce, United Air Lines, for his excellent work on the public address system. He keeps passengers informed without overdoing it.

• •

Conversation overheard at Chicago's Midway Airport; "I was arriving from the West Coast and had a connection to Washington. The flight was on the ground five minutes early, but we sat for 35 minutes because there weren't any gates available. I missed my flight." Having had a somewhat similar frustrating experience at Chicago (we made our connection with two minutes to spare), we sympathize with the gentleman. With today's schedule frequency, Midway is bursting at the seams.

Sales, Traffic, Promotion

Pan American World Airways' Latin American Division is using visual aids for sales promotion. Available to employes are all-aluminum blue and white lawn markers which have on them the individual's house number and the PAA wing and world. The white marker reflects at night. Both come with a spear for sticking in the ground or an attachment for mail boxes. LAD also has reflecting "scotch lite" stickers for auto bumpers. . . .

PAA's New York and New Orleans offices have found a good travel market among antique dealers (there are 12,000 in the U. S.). New York has also been successful with diamond merchants who fly to Europe and South Africa and with feather and button importers who travel to Japan. . . . PAA reports that out of 10,000 "pay later" passengers, only one has defaulted on payments, and he because of death (default by death is covered by insurance). . . .

Northwest Airlines has prepared an A-1 booklet, "10 Reasons Why People Fly Northwest Orient Airlines." It's the first item in an extensive direct mail program promoting domestic Stratocruiser service. About 100,000 were mailed. Booklet was prepared by Kirker Peterson Co., Minneapolis ad agency. Second mailer will plug deluxe food service. . . . NWA is opening off-line sales offices in Dallas and Atlanta. . . .

KLM Royal Dutch Airlines has gone all-out to feature the travel agent in its advertising, claiming to be the first airline "to give travel agents 100% support." In a double-page ad in travel agents' magazines, KLM says that it "headlines" the agent in its ads, and "uses its own addresses only to answer requests for information about travel agents. Anyone who writes from your town receives your name." . . .

National Airlines is aiming for sale of 20,000 "Millionaire's Vacations on a Piggy Bank Budget" this season (May 1-Nov. 30). The package vacation promotion is in its sixth year. . . . Trans-Canada Air Lines has distributed to travel agents a well-prepared, attractive brochure containing several types of Viscount promotional material that are available—folders, streamers, postcards, baggage stickers, etc. . . .

Braniff Airways is now using a new seat pocket booklet containing strip maps of domestic and international routes. Next to each map is descriptive material about cities to visit, details of time payment plan, etc. Booklet has been in preparation for two years, says Rex Brack, vice president-traffic and sales. . . . Braniff has started late evening coach service between San Antonio and Denver via Austin, Dallas and Oklahoma City, using Convair equipment. . . .

New United Air Lines folder lists tips on how to take advantage of "free mileage" by using optional routings on transcontinental trips. Folder emphasizes unlimited stopover privileges for first-class passengers. . . . UAL has been doing considerable advertising in dog publications ("Fido Goes 1st Class") on its Tuttle Kennel service. Last year UAL carried 9,835 dogs; kennel rental grossed $49,175, plus air freight or excess baggage charges. . . .

TWA is now booking air freight space on its New York-Los Angeles Super-G Constellation flights. The new service, called "Super-G Booked Freight," will be extended later to Chicago, St. Louis, Kansas City and San Francisco. . . . A group of airline cargo representatives in Washington, D. C., has formed an Air Cargo Association "to promote intelligent public opinion of the local air cargo industry and to create a high standard of service through interline cooperation." Phil Deslauriers of TWA is president. . . .

With the battle for non-stop transcontinental business growing more intense, American Airlines recently used newspaper ads to defend its published scheduled flight times against those of TWA.

In New York ads headed, "How long does a coast-to-coast flight *really* take?" AA asserted that "consistently, the Douglas DC-7 takes less time to transport you to Los Angeles than any other competitive type, irrespective of the flying time claimed in the schedules." TWA was not mentioned by name, but it is the only carrier using another type of equipment.

AA and TWA publish eastbound Los Angeles-New York times of 7 hrs. 40 mins. Westbound, however, TWA's Super Constellation time is given as 7 hrs. 55 mins. against AA's 8 hrs. 35 mins. The difference dates back to last year's eight-hour flight rule controversy. Although TWA's westbound flights may exceed eight hours, it has a contract provision against scheduling stewardesses for more than eight hours.

". . . Patrons of air transportation who depend on the flying times published by the airlines are entitled to know the facts . . . The Douglas DC-7, used by American . . . is the fastest airline transport operating in the world today," AA's ads said.

Equipment notes: Pan American World Airways on May 16 replaces Convairs with DC-6B's on route from Miami to San Juan via Camaguey, Montego Bay, Kingston, Port au Prince and Ciudad Trujillo. . . . Northwest Airlines moved up from May 15 to April 27 the inauguration of Turbo Constellation service (three flights weekly) between Seattle-Tacoma-Portland and Honolulu. Plane accommodates 15 first-class and 54 tourist passengers. . . . United Air Lines and Western Air Lines have put DC-6B's in Los Angeles-San Francisco-Portland-Seattle coach service on night turnarounds of equipment used on daytime standard fare schedules. All Pacific coast coach service was formerly with DC-4's. This represents the first time in the west for odd-hour utilization of standard fare planes at coach tariffs. . . .

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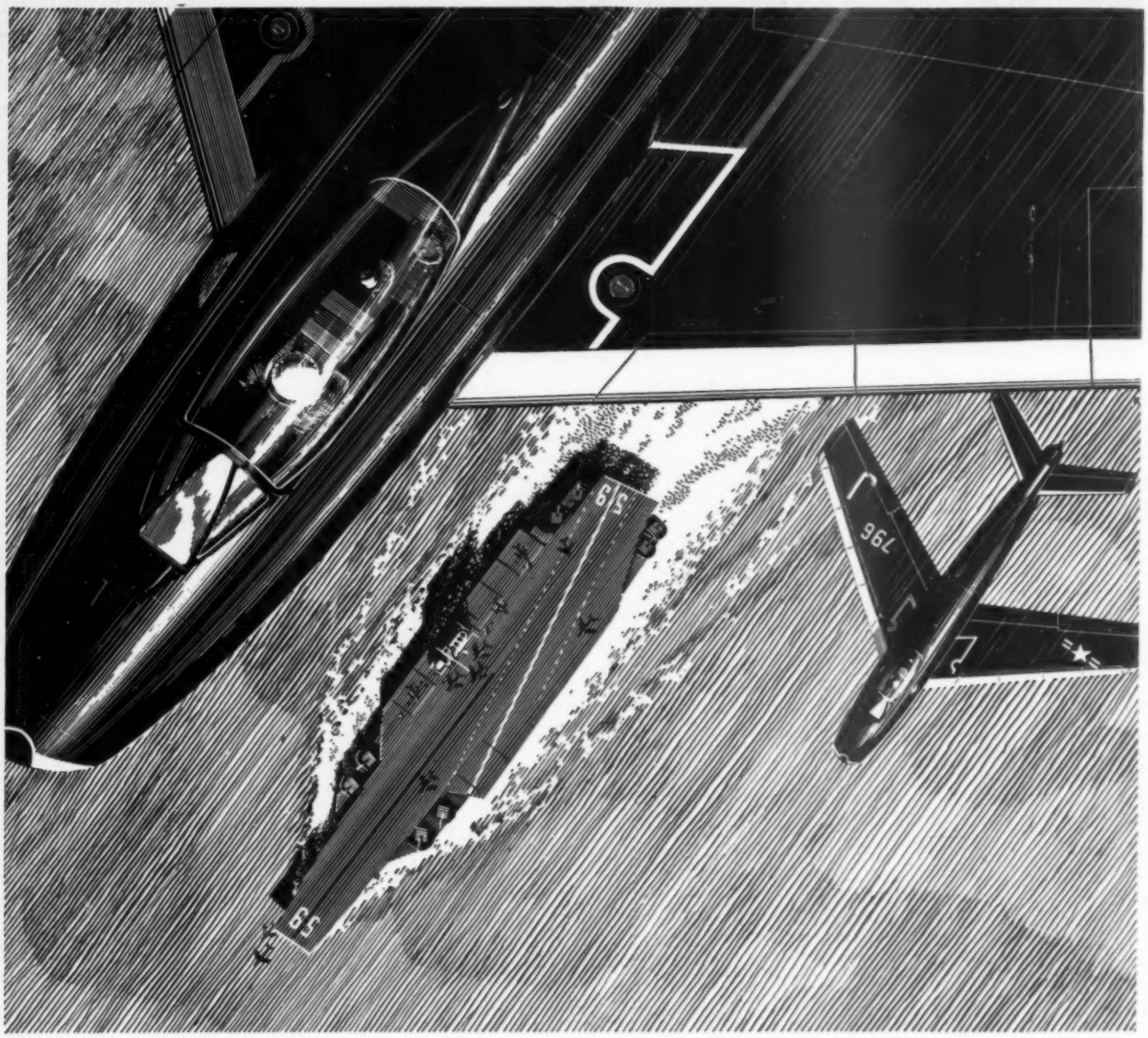

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WAYNE W. PARRISH

A Sleepy Village Becomes a Bustling Giant

Take my word for it, Caracas, the capital of Venezuela, is a sight to behold.

Two decades ago it was a typical sleepy South American town of narrow streets, poor hotels, hide-bound traditions and noise. Today it is one of the most modern, beautiful, spectacular, bustling cities in the western hemisphere, if not the world. It is no longer asleep. And it is no longer noisy.

Venezuela has a population of about five million. One-fifth now lives in and about the capital. The old town is being torn up and replaced with skyscrapers, modern buildings and homes, wide avenues and expressways, on a scale that is breathtaking even to an American who thinks only the U. S. A. can undertake new construction on a gigantic scale.

I first visited Caracas in 1948 with Capt. Eddie Rickenbacker. I was impressed that physical changes were under way, but I was skeptical about the speed. I've seen many ambitious projects on Latin America fall flat and never get completed. Three years ago I was there with C. E. Woolman, president of Delta Air Lines, and Sid Stewart, then president of Chicago & Southern Air Lines. I got quite a jolt. I discovered these Venezuelans can really do things.

But the big surprise came on this recent trip when Delta-C&S inaugurated DC-7 service down there. I hardly recognized the place. The pace of uprooting and reconstruction and new construction has been terrific. And if the pace keeps up, I'll have to concede that Caracas will be the single most handsome, modern, streamlined city in the world.

New High in Low-Cost Housing

There's a reason for all this, of course. The government takes in $1.5 million a day in oil royalties in a very fair, mutually beneficial deal with U. S. oil companies. It is beginning to benefit similarly from its vast iron ore resources. This money is being used to build the most handsome slum clearance low-cost housing projects, avenues, hospitals, schools, university buildings, parks you'll find anywhere. The type of construction lends itself to all kinds of unusual modern architectural forms. The climate is such that heating, for example, is not needed. Reinforced concrete is the primary medium. So the result is expansive use of glass and concrete, to which the Venezuelans have added a very important item—color.

I happen to be one of those guys who likes a dash of color here and there. I think the Venezuelans have reached a new high in architectural beauty by the manner in which they have used pastel colors on the exteriors of buildings, not just huge ugly splashes, but in rectangular panels and strips in the most advanced modern manner. It's almost impossible to describe it in words, but I wish you'd go down and take a look at some of those projects such as the huge hospital which is an outstanding example.

I didn't get closer than a quarter of a mile to one of the big slum clearance housing projects, but from that distance it was so spectacular as to be unreal. A half dozen or so rectangular 15- to 17-story blocks of glass and concrete, each in a different pastel shade, rose on a hillside formerly occupied by sordid slums. Each building was just like a miniature of the U. N. Building in New York.

Certainly one of the eye-poppers is the Officers' Club for the military which cost something over $13 million. I've seen some costly and handsome buildings in various parts of the world, but nothing surpasses this one in AA-1 taste. It's out of a dream, especially at night. Lots of costly projects merely look like they cost a lot of dough, but this one is truly beautiful and is tastefully decorated. Marble is used profusely, but is used properly and well.

$100 Noise Suppressor

If you think we have automobile traffic, Caracas certainly has more than its share. And it is being accommodated with fine avenues and parkways. Neon lights are in profusion everywhere. And, believe it or not, there's a $100 fine for sounding your car horn except in real emergency, so the traffic moves quietly for the most part. You'll still find traffic jams in those areas where construction is underway or not yet started, but the progress has been great.

As for hotels, I stayed in the Tamanaco, the big new deluxe hotel managed by the Intercontinental Hotel Corp. which Pan American World Airways started some years ago with a great amount of forethought and wisdom. (You'll find the IHC group of hotels listed on the inside front cover of the OFFICIAL AIRLINE GUIDE each month; each hotel in this group is top-notch.)

I don't know how you poor folks were living on the weekend I was in Caracas, but I had a very fine big room with a balcony overlooking part of the city. Out in front was a big swimming pool and lots of places to sit around under umbrellas and sip daiquiris or whatnot, and very frankly I could have enjoyed that luxury for quite a spell, but these airlines are funny that way. Delta thought a couple of days was enough so before I knew it I was back at work in Washington. It was wonderful while it lasted.

There's another good hotel in Caracas called the Avila in which I've stayed twice before. It was built early in World War II, is smaller, but the food is excellent, and I rather like it. In any event, the hotel shortage in Caracas is over and you can't lose at either place, but you must visit the Tamanaco in any case just to wallow in plush luxury if only briefly.

I saw two old friends in Caracas, one being Dick Gluski, whose Agencia Candes is the representative for Delta. Dick is a handsome young Pole who distinguished himself in World War II and headed for Venezuela to start a new life when his homeland was absorbed quite thoroughly and abruptly by USSR. I give him a lot of credit. He married a fine American gal and has built himself a good business and reputation.

The other old friend was Alan S. Kipping, who was once associated with Gluski, but who now has his own firm representing Bell Aircraft helicopters and other items. Alan is an alert guy who ought to go places. He's looking for more aviation products to represent down there, and I recommended one which I hope he'll be able to line up.

Caracas' fabulous Hotel Tamanaco

Modernistic slum clearance projects

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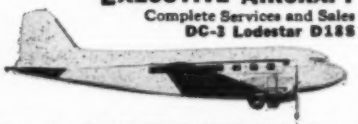

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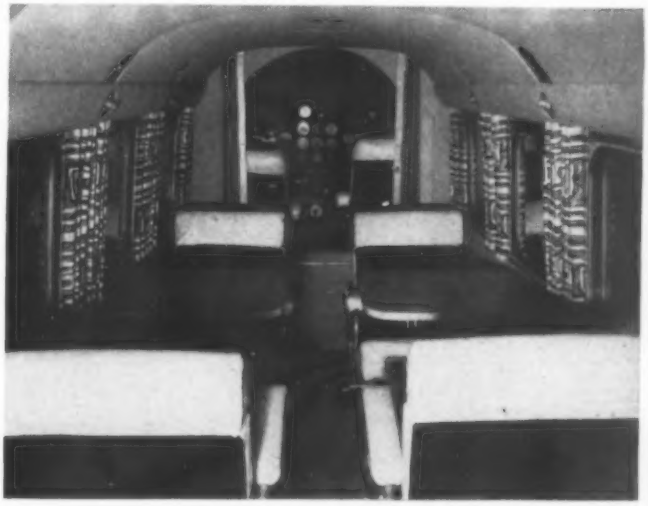

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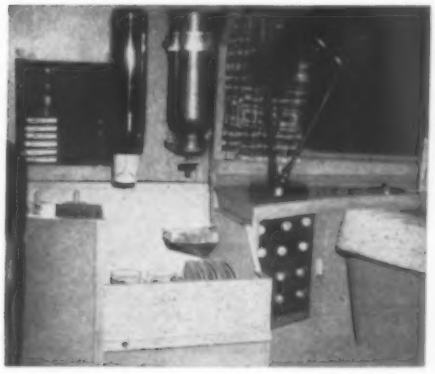

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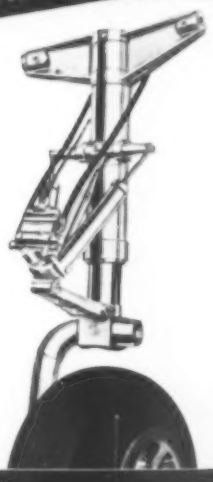

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